

The New York Times Building

Executive Summary

Excerpt for Lighting Controls
December 31, 2004

The lighting controls scope of work is based upon the philosophy that occupants of commercial office buildings prefer natural light to electric light. The lighting controls system specified by The New York Times for its new headquarters building is a DALI (Digital Addressable Lighting Interface) based system with dimmable fixtures throughout the interior space. This allows the system to dim down the electric lighting in response to daylight admittance. It also provides for variable target set points for illuminance levels at the work plane. The New York Times intends to establish and adjust target set points on a departmental basis. The lighting control sequences are described within the specification 16575. These sequences utilize occupancy sensors, photo sensors, switches and a time clock to control the lighting in the interior space on each floor. The emergency lighting system is also described within the specification. The lighting control sequences are tied to Control Intent Diagrams that divide up the space on each floor into its various control zones. The overall intent is to provide electric light only when the space is occupied and to provide as little electric light as is necessary to achieve the target set point for the work plane in a given department. A department usually occupies multiple floors.

This specification has been made public in order to assist design professionals by providing an example of a daylight harvesting, fully dimmable lighting controls system that has been market tested. This specification combined with reflected ceiling plans, lighting fixture layouts and DALI ballast specifications was competitively bid and led to the award of the lighting controls system contract on October 4, 2004. The DALI ballasts (refer to specification 16510) were awarded as an integral part of the lighting controls contract.

Glenn D. Hughes
Director of Construction
The New York Times

PART 1 -

PART 2 - GENERAL

2.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this Section.
- B. Sequence of Operation as shown on the Drawings and in this Specification.
- C. Lighting Control Schedule as included in this Specification.
- D. LCS Supplier shall coordinate all of the work in this Specification with all trades covered in other sections of the specifications.
- E. Related Sections to include the following:
 - 1. Division 16, Section 16510, Lighting Fixtures and Ballasts
 - 2. Division 12, Section 12494, Roller Shades
 - 3. Division 1, Sections 01100, 01270, 01330, 01400, 01600 and 01700

2.2 SUMMARY

- A. Scope: This Specification includes the following:
 - 1. Furnish a fully functional digital addressable lighting control system for the general control, configuration, and management of designated lighting fixtures via local area network and lighting control network in accordance with this Specification and the project construction documents.
 - 2. Furnish all hardware.
 - 3. Furnish all system engineering, programming, testing, start-up and commissioning required for a complete and operational system.
- B. By others: The Electrical Installation Contractor shall furnish and install the following under separate contract:
 - 1. All wiring installation requirements including, but not limited to cables, conduits, raceways, electrical boxes, fittings and supports for these wiring installation requirements.

2.3 DEFINITIONS

- A. **Address:** A way of identifying a specific device or groups of devices. Digital Lighting Interface Interface (DALI) systems have three levels of addresses: broadcast, group, and individual. Individual addresses are required to perform most queries and to make group assignments. Messages can be sent to individual devices, groups of devices, or to all devices (broadcast).
- B. **BMS:** Building management system.

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- C. **Broadcast Command:** A command that is received by all devices on the network. As an example, a broadcast off command will turn off every device that receives the command and is able to process it.
- D. **Channel:** A fixture or group of fixtures controlled simultaneously as a single entity. Also known as a "zone."
- E. **DALI:** Digital Addressable Lighting Interface: IEC Standard 60929, Annex E & G or most recent revision or equivalent ANSI standard.
- F. **Fade:**
 - 1. Fade Override: The ability to temporarily set fade times to zero for all lighting scenes.
 - 2. Fade Rate: The time it takes each channel to arrive at the next scene, depending on the degree of change in lighting level.
 - 3. Fade Time: The time it takes a channel to fade from one lighting scene to another.
- G. **FC:** Footcandle.
- H. **Group:** A designated group of luminaries that will turn on and off and dim in unison. Also called a zone.
- I. **LAN:** Local Area Network.
- J. **LCS:** Lighting Control System.
- K. **LCS Supplier:** Lighting Control System Supplier
- L. **LED:** Light-Emitting Diode indicator light.
- M. **Lighting Control Network:** A digital network.
- N. **DALI Lighting Control Network:** Also called a Loop. A powered digital communication network with 64 DALI addresses.
- O. **Loop:** A powered Lighting Control Network conforming to the DALI standard.
- P. **Monitoring:** Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.
- Q. **NRTL:** Nationally Recognized Testing Laboratory.
- R. **PC:** Personal Computer using IBM protocols and Microsoft operating system, sometimes plural as "PCs."
- S. **PIR:** Passive Infrared.
- T. **Scene:** A lighting state or effect created by adjusting several channels of lighting to the desired intensity.
- U. **Site:** The New York Times new building location at 620 8th Avenue, New York, NY.
- V. **Specification:** Lighting Controls System Specification 16575
- W. **TVSS:** Transient voltage surge suppressor.
- X. **Zone:** A designated group of lighting fixtures that can be controlled in unison.

2.4 SUBMITTALS

- A. General: Submittals shall be in hard-copy and electronic format.
 - 1. Hard-copies shall be in quantities consistent with that specified in Division 1 of these specifications.
 - 2. Electronic format shall be on a CD-ROM in the following file types:
 - a. MS Office Word 2003
 - b. MS Office Excel 2003
 - c. MicroStation version J DGN

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- d. AutoCAD 2002 DWG
 - e. Adobe Acrobat PDF
- B. Product Data: List of components for LCS, including dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes. Include a complete Bill of Materials for each type of product indicated.
- 1. Dimming control components
 - 2. Photo sensors, occupancy sensors
 - 3. LAN components
 - 4. Lighting control network devices
 - 5. Ballasts and lamp combinations compatible with dimmer controls – ballasts and lighting fixtures shall be furnished under separate contract(s)
 - 6. Sound data including results of operational tests of dimming controls
 - 7. Control wire and cable connectors to include identification where each type will be used – wire and connectors shall be furnished and installed by the Electrical Installation Contractor in accordance with LCS Supplier Product Data requirements
 - 8. Control wire and cable to include color and insulation type – wire and connectors shall be furnished and installed by the Electrical Installation Contractor in accordance with LCS Supplier Product Data requirements
- C. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on this Project. Shop drawings shall be delivered in accordance with a schedule developed in consultation between the Owner and the LCS Supplier.
- 1. Outline Drawings: Indicate dimensions, weights, location arrangement of LCS components for each floor from the cellar to floor 28, inclusive.
 - 2. Floor plans: Show location, orientation, and coverage area of each sensor for each floor including floors 2 through 28 and the NYT spaces in the cellar.
 - 3. Riser Diagrams: Show interconnections throughout the building between components specified in this Section and devices furnished under other Sections. This includes vertical risers in the tower from the cellar to floor 28, inclusive; and, in the podium including floors 2, 3 and 4. Include power, control, data and emergency lighting system on the riser diagrams.
 - 4. Block Diagrams: Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
 - 5. Point List and Network Load: List all control devices, sensors, ballasts, and other loads connected to each lighting control network and total connected load for each lighting control network. Include percentage of rated connected load and network addresses.
 - 6. Wiring Diagrams: Detail specific power, control, data, emergency and night-light wiring for each floor from the cellar to floor 28, inclusive. Clearly differentiate between manufacturer-installed and field-installed wiring. Show interconnecting signal and control wiring and interfacing devices. Field-installed wiring shall be performed under a separate contract by the Electrical Installation Contractor.
 - 7. Control Wiring Termination Drawings: Provide wire numbers and termination points for all control wiring on a separate drawing for each floor.
 - 8. Panel Schedules: Show all lighting panels and branch circuits including all emergency lighting circuits and their sources.

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9. Nomenclature: Coordinate all devices within a master naming convention for the lighting system. A hierarchy of LCS components shall be developed by floor.
- D. Installation Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other.
 1. Suspended ceiling components
 2. Structural members to which lighting-fixture suspension systems will be attached
 3. Items in finished ceiling, including the following:
 - a. LCS components and wiring
 - b. Light fixtures, power and control wiring
 - c. Shade system control components, power and control wiring
 - d. Sound masking and/or Public Address speakers and wiring
 - e. Sprinkler heads and piping
 - f. Access panels
 - g. Supply air diffusers and return air inlets
 - h. Fire alarm system devices and wiring
- E. Network Communications Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other sections of the specifications.
- F. Samples: One for each type of wall switch, sensor device and wall plate specified, in each color specified.
- G. Software and Firmware Operational Documentation:
 1. Software operating and upgrade manuals.
 2. Program Software Backup: On a magnetic media or optical compact disc, complete with data files.
 3. Device address list.
 4. Printout of software application and graphic screens.
- H. Software Upgrade Kit: For Owner to use in modifying software to upgrade and to allow system expansion.
- I. Record Documents: Drawings in electronic format, preferably MicroStation version J, showing the actual installed wiring, control device identification and locations, and schedules of control functions, loop number and address of all ballasts and other addressed devices.
- J. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
 1. Submit printed points list.
 2. Submit representative trend data for a minimum of 25 zones chosen by Owner that verify compliance with the written sequence of operation.

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- K. Maintenance Data: For LCS equipment components to include in maintenance manuals specified in Division 1 of the specifications.
- L. Operation and Maintenance Data: For lighting controls to include in emergency, operation and maintenance manuals. In addition to items specified in Division 1 include the following:
 - 1. Software manuals.
 - 2. Adjustments of scene preset controls, adjustable fade rates, and fade overrides
 - 3. Operation of adjustable zone controls
 - 4. Testing and adjusting of emergency lighting and night lighting feature
 - 5. Methodology for revising target set points
 - 6. Methodology for revising zones make-up
 - 7. Methodology for revising time clock functions and settings
 - 8. Methodology for enabling and disabling occupancy sensors

2.5 QUALITY ASSURANCE

- A. Source Limitation: Obtain all lighting control components and final commissioning from the LCS Supplier.
- B. Lighting control components shall include all operating elements of the lighting control system such as: occupancy sensors, wall controls, photo sensors, routers, computer(s), software and other devices and software that are an integral part of the LCS. All control equipment shall be tested and burned-in at the factory prior to delivery to the Site. Lighting fixtures, lamps, digitally controlled ballasts, and passive components such as wire, conduit, and connectors are not included.
- C. LCS Supplier Qualifications: A firm experienced in sourcing a complete and integrated package of control equipment similar to that indicated for this Project and with a record of successful in-service performance.
- D. Installer Qualifications: An electrical contractor licensed for work in New York City with IBEW labor. The Electrical Installation Contractor will be managed under a separate contract by Turner Construction Company for the Owner. The LCS Supplier has a supervisory role with respect to the installation of the LCS components and the interconnection wiring.
- E. Startup Personnel Qualifications: The LCS Supplier shall engage specially trained personnel to perform final start-up, configuration, and system testing and commissioning.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- G. Control Panels: Tested and listed under UL and CSA.
- H. Comply with 47 CFR, Subparts A and B, for Class A digital devices.

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- I. Comply with NFPA 70.
- J. Comply with 2002 National Electric Code with New York City amendments.
- K. Comply with NEMA for types of equipment enclosures.
- L. Comply with State and Local electrical codes and approved for use in New York City.

2.6 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Owner and Owner's Rep no fewer than seven days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.

2.7 COORDINATION

- A. The LCS Supplier shall coordinate the design layout of the ceiling-mounted devices with other engineered systems in the ceilings including light fixtures, HVAC equipment, fire-suppression system, sound masking system and shade controls with Architect.
- B. The LCS Supplier The Electrical Installation Contractor shall coordinate the field layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and shade controls.
- C. Coordinate lighting control components to form an integrated interconnection of compatible components.
 - 1. Match components and interconnections for optimum performance of lighting control functions.
 - 2. The LCS is independent of the BMS.
 - 3. Design display graphics showing building areas controlled by the LCS; include the status of lighting controls in each area.

2.8 WARRANTY

- A. Materials Warranty - Manufacturer agrees to repair or replace components of lighting controls that fail in materials or workmanship within the specified warranty period.
 - 1. Failures include, but are not limited to, the following:

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- a. Software: Failure of input/output to execute switching or dimming commands.
 - b. Failure of modular relays to operate under manual or software commands.
 - c. Damage of electronic components due to transient voltage surges.
 - d. Failure of photo sensors to: (i) detect changes in ambient lighting level, (ii) provide feedback to its respective control unit on target illuminance levels.
 - e. Failure of occupancy sensor to: (i) detect presence or non-presence of occupant(s) in the occupancy zone, (ii) provide feedback to its respective control unit on occupancy status.
 2. Warranty Period: Two years from date of Final Acceptance.
 3. Coverage: Cost to repair or replace malfunctioning parts including labor at the prevailing union rates in New York City.
- B. System Warranty (Single Point of Responsibility)
1. LCS Supplier shall provide a full system warranty covering operation of all components and software in accordance with contract documents.
 2. Warranty Period: Five years from date of Final Acceptance.
 3. Coverage to include:
 - a. Cost to repair or replace malfunctioning parts including labor, at the prevailing union rates in New York City.
 - b. Written certification that entire system is working properly.
- C. Post Occupancy Evaluation report one year after Final Acceptance – this is for mutual benefit of the Owner and LCS Supplier to ensure the LCS is operating according to the original design intent.
1. Analysis of the lighting energy usage
 2. Analysis of the integrity of the zones
 3. Analysis of target set points compliance
 4. Analysis of lighting sequences and their application in the various spaces
 5. Status of emergency lighting

2.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Software: One CD-ROM version of the lighting control operating software
 2. System Management Software Updates
 3. Record Drawings: Two of each type submitted in hard copy and one electronic file for each drawing, preferably in MicroStation version J
 4. Line Drivers: Three of each type furnished
 5. Communication Power Supplies: Three of each type furnished
 6. Network Interface Cards: Three of each type furnished
 7. Repeater Units: Three of each type installed
 8. Data Line Surge Suppressors: One for every 10 of each type furnished. Furnish at least one of each type.

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9. Relays: Equal to two percent of amount furnished, but no fewer than two relays
10. Fuses: Equal to two percent of amount furnished for each size installed, but no fewer than three.

PART 3 - PRODUCTS

3.1 LIGHTING CONTROL SYSTEM SUPPLIER

- A. Subject to compliance with requirements, LCS Supplier offering complete digital lighting control systems are limited to:
 - 1. Lutron – Coopersburg, PA
 - 2. Siemens Energy & Automation, Inc. - Pine Brook, NJ
 - 3. Starfield Controls, Inc. - Westminster, CO
 - 4. Tridonic Inc. – Norcross, GA

3.2 SYSTEM REQUIREMENTS

- A. Expansion Capability: Adequate to increase the number of control functions in the future by 20 percent. This expansion capability applies as applicable to equipment ratings, housing volumes, spare relays, terminals, number of conductors in control cables, network addresses, device connected load, and control software.
- B. Line-Voltage Surge Suppression: Factory installed as an integral part of 120vac and 277vac, solid-state control panels and control components.
 - 1. Alternative Line-Voltage Surge Suppression: Field-mounted surge suppressors that comply with UL 1449 and with IEEE C62.41 for Category A locations.
- C. Manual switch operation or automatic sensor actuation sends a digital signal to its corresponding relays and ballasts to perform the intended function, such as on, off, dim, fade and the like.

3.3 LIGHTING CONTROL SYSTEM

- A. General
 - 1. Lighting management software shall be MicroSoft Windows based with multiple security levels.
 - 2. Controls components include: ballasts (furnished by the Ballast Supplier), photo sensors, occupancy sensors, dimming switches, control panels and other interface electronics required to create a comprehensive lighting control system with a central system console. All type F1 lighting fixtures shall be DALI.
 - 3. A database management system shall be provided that logs all commands emerging from the LCS. The database shall be protected and shall be easily backed up regularly onto a CD. The database shall be subdivided into annual database buckets.
 - 4. System architecture shall include:
 - a. System console/PC
 - b. Backbone communications network

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- c. DALI networks for DALI devices
 - d. Separate networks for non-DALI and DALI-compliant devices
 - e. Refresh rate shall be less than 30 seconds on the system
 - f. Diagnostic and commissioning tools
- B. Scheduling of scenes by location and by time of day
- C. Emergency lighting system – a number of lighting fixtures on each floor shall be designated emergency fixtures. These fixtures shall provide a 2 (two) FC egress path for occupants. Refer to the Control Intent Diagrams for Typical Emergency Fixtures. The emergency fixtures shall be on separate emergency power circuits. Under normal conditions these emergency fixtures will operate during daytime hours (sunrise to sunset) at the output level required by the daylight dimming sequence in that space or at a pre-specified output level where no dimming sequence is required. Under normal conditions at night (sunset to sunrise) these emergency fixtures will operate at a pre-specified output level. When emergency power is initiated via energization of the life-safety generator, normal controls shall be overridden and the emergency lights shall revert to the emergency power setting. The emergency power setting (output level) shall be 100%. The LCS shall be restored to full auto mode upon recovery from an emergency power event. Recovery shall occur immediately after the life-safety generator is deenergized. The emergency control units must be UL listed, approved for use in New York City and MEA (Materials Equipment and Acceptance) approved. The Engineer shall certify all emergency lighting fixture locations.
- D. Night-light system – each emergency light fixture on each floor shall remain on at night at a pre-specified output level regardless of occupancy.
- E. Lighting system energy usage shall be measured at the high voltage (HV) panel on each floor. These measurements shall be used to check energy usage calculations and reports. A split bus HV panel shall be provided (typically) by the Electrical Installation Contractor, which shall keep all lighting loads separate from other loads on the HV panel.
- F. Lighting Controls System searchable database
 - 1. An archived log file shall be maintained in the system drive(s).
 - 2. The log file shall provide deterministic values including, but not limited to: photo sensor data, occupancy sensor state and system control mode (auto, manual and maintenance).
 - 3. The system shall monitor and store all requisite change-of-value data needed to troubleshoot control operations including: date, time of day, lighting control zone ID, ballast output levels, sensor output values, time delay set points and time delay values.
 - 4. Data shall be stored on a daily basis.
 - 5. Data shall be exportable to a MicroSoft Excel or Access database format.
 - 6. Data shall be automatically archived.
 - 7. System reports shall be available to the System Operator and all security levels above System Operator. The system shall trend real-time and historical data.
- G. Reporting
 - 1. Energy usage
 - 2. Failure report (lamp & ballast)

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3. Target set point map
 4. Switching events (ballast on/off)
 5. Lamp hours
 6. Commands usage
 7. System failures
 8. Trend
- H. Load shedding program to include relative power shaving feature.
- I. Self-diagnostic and self-corrective features shall be included in the system using the following defined rules. The system shall interrogate itself with respect to these rules and where mismatch between the anticipated condition and the measured condition is identified, then the system will create an alarm and attempt a reset. If the system does not correct itself upon reset, then another higher level alarm condition shall be initiated.
1. If lights are on in a zone that the photo sensor indicates the target light level is exceeded by more than 25 FC for five (5) minutes.
 2. If one ballast in a zone is at an output level in variance (more than 20%) with the other ballasts in the zone.
 3. Recovery from power failures – the system shall set itself to the state required by the conditions in the space at the point of time of restoring power.
- J. Timeclock - the time switch shall function to prevent lighting from being energized at pre-set periods each day. The time switch shall permit different “ON-OFF” settings for each day of the week, with provision for omitting selected days. The time switch shall have at least four (4) inputs. Unit shall be capable of retaining memory for no less than 90 days. When permitted by the time switch, photoelectric controls shall operate to energize lighting whenever natural lighting falls below twenty five (25) FC.
- K. Daylighting Control
1. If sufficient daylight is available in the space to achieve target illumination level at the work plane, then the lights shall be turned off.
 2. If the target illumination level at the work plane is not achieved, then electric lights will be turned on and dimmed to achieve the target illuminance level.
 3. The fade rate for the electric lights will be from 2 to 5 minutes so that dimming is imperceptible to the occupants.
- L. Larger zones may be created than defined in the Control Intent Diagrams in Part 4 of this specification. The larger zones may be controlled with offsets for subset(s) of the fixtures. Optimize the number of sensors and zones.
- M. The light fixtures and all other lighting devices shall be identified within the master lighting controls system console/PC. The methodology for establishing fixture nomenclature shall include floor, sector and zone designations. A hierarchy shall be established that facilitates the location of any specific fixture physically and within the system (virtually). All ballast addresses shall be bound to a specific fixture or device.
- N. Graphic User Interface (GUI) shall be customized to this project through easy-to-use applications and shall include:
1. Map of each floor showing all zones with active target set points

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2. Map of each floor with illuminance levels as measured by the system photo sensors
 3. Device parameters shall be displayed. What is to be displayed is dependent upon the application.
- O. Target set points – the system shall allow for variable target set points. The set points for any zone or combination of zones shall be adjustable by the System Operator at the main lighting control system console/PC.
- P. DALI system capacity – the layout shall allow for expansion within each DALI group. It shall limit the number of addressable units in a DALI group to 48. It shall limit the system current to 80% of maximum allowable connected load. The maximum allowable connected load is 190 milliamperes (mA).
- Q. Single master mode of operation shall be the basis for the connectivity of all lighting system components. The non-DALI and DALI-compliant devices such shall be connected directly to the DALI control unit, not through the DALI ballasts.
- R. Stand-alone system shall be the basis for the design.

3.4 SOFTWARE

- A. Lighting Control Software: Features and functions include the following:
1. Password Protection: minimum of two configurable security levels – (i) System Operator and, (ii) System Administrator
 2. Operates in multitasking, multi-user environment. Windows NT or compliant.
 3. On-Line help with on-line monitoring by LCS.
 4. Coordinates the communications of the network.
 5. Provides mouse-driven graphic interface with devices depicted on the floor plan and single-line diagram screens.
 6. Provides interactive color-graphics to show status and properties of individual control devices on both floor plans and single-line diagrams.
 7. Logs user-defined power monitoring and control and power distribution system events including log on/off; attempted log on/off; alarms; and, equipment operations; with date and time stamps.
 8. Exports and imports data to and from commonly used Windows spreadsheet, database, and other applications; uses dynamic data exchange technology.
 9. Reports Trends: Instantaneously, in a real-time or historical tabular format, bar chart, or user-defined time, trend plots of monitored parameters; unlimited as to interval, duration, or quantity of trends.
 10. Manages Maintenance Function: Annunciates and logs maintenance messages from discrete input and controls outputs, according to programmable security access protocol using the communication network.
 11. Programs: Provide custom program for the operation of the LCS based upon the sequences of operation and control schedules for the project. Utilize industry standard software that is modifiable by the end user.
 12. Display: Single graphic display for programming lighting control panelboards if applicable.

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13. System Memory: Nonvolatile. System shall reboot program and reset time automatically without errors after power outages up to 90 days' duration.
14. Software: Lighting control software shall be capable of linking switch and sensor inputs to relay and ballast outputs, retrieving links, viewing relay and ballast output status, controlling relay and ballast outputs, simulating switch and sensor inputs, setting device addresses, and assigning switch and sensor inputs and relay and ballast output modes.
15. Automatic Time Adjustment: System shall automatically adjust for leap year and daylight saving time and shall provide weekly routine and annual holiday scheduling.
16. Astronomic Control: Automatic adjustment of sunrise and sunset switching based on location of the Site and time of year.
17. Remote Communication Capability: Allow programming, data-gathering interrogation, status display, and controlled command override from a PC at a remote location over the Internet. System shall include firewalls and control software, and remote computer compatibility verification for this purpose.
18. System Override Capability: System Operator may override programmed shutdown of lighting and may override other programmed control for intervals that may be duration programmed.
19. Automatic battery backup shall provide power to maintain program and system clock operation for 90 days' minimum duration when power is off.
20. Compatibility with dimmer controls shall permit commands that change preset scenes and dimmer settings according to programmed time signals.
21. Daylight Balancing Dimming Control: Control components shall interpret variable analog signal from photoelectric sensor and shall route dimming signals to selected groups of fixtures containing dimming fluorescent ballasts. Signal shall control dimming of fixture in accordance with the sequence of operation.
22. Diagnostics: When system operates improperly, software shall initiate factory-programmed diagnosis of failure and display messages identifying problem and possible causes.

3.5 WORKSTATION/SERVER

- A. Central-Processing Workstation/Server: Desktop PC installation capable of communicating with a minimum of 20 percent greater than the number of lighting control devices on this project, and including the following minimum peripherals, accessories, and features:
 1. RAM: 256 MB
 2. Hard-Disk Drive: 30 GB
 3. CPU: 1,000 MHz
 4. CD-RW/DVD-ROM Drive: not less than 16 X
 5. Monitor: 17 inch flat screen LCD monitor, HP Flat Panel Monitor L1730
 6. Video Memory: 2 MB
 7. Operating System: Window XP Pro or as required by manufacturer. Include license, documentation and storage media
 8. Keyboard: Standard
 9. Mouse: Two button with roller wheel
 10. Two serial ports: RS232 serial communicator

11. One parallel port: with Windows printer driver
12. Two USB ports
13. Two Network Interface Cards: Compatible with building LAN system. 100/10basT Ethernet, computer operated, with two-way communication transmitter-receiver chip
14. Modem: Internal, 56K baud, minimum
15. Automatic Reboot Capability: When power is restored after an outage
16. Power Supply: Internal, sized to serve all peripherals with a minimum of 25% spare capacity
17. Printer: Color ink jet
18. Backup Battery-Inverter Power Supply: Automatic, rated 650-VA output for 10 minutes. Arranged to supply computer, accessories, and peripherals, not including a printer. Include transient voltage surge suppressor and electromagnetic-interference filters.

3.6 CONTACT INPUTS

- A. The control system shall support dry contact inputs and these inputs shall be software linkable to any number of relays for override control.
- B. The control system shall support digital/switch inputs, momentary toggle inputs and maintained contacts.

3.7 RELAY CONTROL

- A. Factory assembled with modular single-pole relays, power supplies, and accessory components required for specified performance. On/off function may be provided by relays or with internal on/off circuitry in ballasts and similar devices listed for that function. Mechanical on/off operation may be either distributed or grouped into relay panels as consistent with the manufacturer's design concept. The control system shall employ an all-modular design for easy addition or replacement of input or relay output modules.
 1. Grouped Relay Enclosure:
 - a. NEMA class 1 or as required by local jurisdiction and for the installation location.
 - b. Lockable enclosure.
 - c. Steel enclosure per UL916.
 - d. Barriers separate low-voltage and line-voltage components.
 - e. Identification: Mounted on cover. Identify each relay as to address and load groups controlled.
 2. Grouped Single-Pole Relays:
 - a. Low-Voltage Leads: Plug connector-to-connector strip in cabinet and pilot light power where indicated with mechanical or electrical latching.

- b. Rated Capacity: 20A, 125vac for tungsten filaments; 20A, 277vac for electronic ballasts.
 - c. Endurance: 1,000,000 cycles at rated capacity.
 - d. Mounting: Provision for easy removal and installation in relay enclosure.
 - e. Local Control: Provide means to manually actuate the relay at the relay enclosure even in the absence of control power to the relay module.
 - f. Indicator Light: Provide a local indicator light to indicate the closed status of the relay at the relay enclosure.
 - g. Relay output timer: Provide output timer capable of various durations for each relay.
 - h. Two pole loads: two relay outputs may be switched for two pole loads.
3. Distributed Relays:
- a. Same capacity and ratings as grouped relays.
 - b. Designed to be mounted locally in lighting zone and in accordance with local jurisdiction requirements.
 - c. Indicator Light: may be local or remotely queried and displayed by lighting system management computer.
 - d. Identification: Identify each relay with lighting control network and device address.

3.8 Panels

- A. Panels shall be wall mounted NEMA grade, constructed of sheet steel plates not less than #16 U.S. gauge. Contractor shall reinforce wall as required for wall-mounted panels.
- B. Panels shall be completely pre-wired by the manufacturer. The installation contractor shall be required to provide input feed wiring, load wiring, and control wiring. No other wiring or assembly by the installation contractor shall be permitted.
- C. Unless otherwise indicated, panels shall contain branch circuit protection for all lighting circuits. Branch circuit breakers shall have the following performance characteristics:
 - 1. U.L. listed under U.L. 489 as a molded case circuit breaker for use on lighting circuits.
 - 2. Contain a visual trip indicator and shall be rated at 10,000AIC (120V) or 14,000 AIC (277V), unless otherwise noted.
 - 3. Thermal-magnetic in construction for both overload and dead short protection. The use of fully magnetic breakers shall not be acceptable, even when used in conjunction with individual dimmer thermal cutouts.
 - 4. Switching duty (SWC) rated so that the loads can be switched off via the breakers.
- D. Panels shall be cooled via free-convection, unaided by fans, and capable of continuous operation to all of these section specifications within an ambient temperature range of 0°C (32°F) to 40°C (104°F).
- E. Panels shall have the following additional performance characteristics:
- F. Be designed to prevent any foreign objects from coming in contact with any part of the panel, which would be at an elevated temperature.
- G. Be designed to provide airflow across the heat sink areas and through the dimmer chassis. Panel sections, which provide airflow only across heat sinks, shall not be mounted one above another in order to allow for adequate heat dissipation.

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- H. Panel shall provide capability to electronically assign each fixture to any zone in the dimming system.
- I. Multiple panels shall be capable of operating in one system. Provide as many panels as necessary to house the required control units and main lighting control system. Operating voltage shall be 277 volts. Panels shall be provided with main circuit breakers. Branch circuit breakers shall be 20A.

3.9 DALI LIGHTING CONTROL NETWORK POWER SUPPLY

- A. Lighting Network power supply shall comply with DALI or equivalent requirements.
- B. Power supply shall be fully regulated to maintain operating voltage within full range of rated connected load and during charging cycle.
- C. Rated connected load shall be no less than 80% of rated charging load.
- D. Power supply shall be Class 2.

3.10 FLUORESCENT DIGITAL DIMMING BALLASTS

- A. Ballasts shall conform to DALI standard and protocol and as required in section 16510 of the specifications.
- B. Voltage: 277 vac
- C. Ballasts shall be controlled individually or as a zone. Each ballast or group shall be addressable and shall include on/off, fade, sweep, dimming, and other standard DALI control functions and as required to meet the sequence of operation.
- D. Fade time, grouping, power-on, system power-on, and other similar settings shall be configurable over the digital network and stored in non-volatile memory at the device or in system node panels in accordance with system architecture. The data shall be protected against power interruptions. The data storage shall be maintenance-free.

3.11 DIGITAL CONTROL NETWORK

- A. Dimmers, scene, and other controls shall be peer-to-peer or receive digital signals from digital network control stations linked through a dimmer cabinet.
- B. Functions of digital network control stations shall be set up to include indicated number and arrangement of scene presets, channels, and fade times.

3.12 MANUAL DIMMING SWITCHES AND PLATES

- A. Switches: Modular, momentary push-button, low-voltage type.
 - 1. Office switches shall digitally communicate with the LCS or peer-to-peer to control light fixtures assigned to that switch. The switch shall be able to actuate

the following functions based upon the described sequence of operation and intended functions, and interact with its related photo-sensors and occupancy-sensors:

- On
 - Off
 - Dim up
 - Dim down
 - Restore (illuminance level upon reentry to the office shall be the same level when last occupied, i.e. restore to prior occupied setting)
2. Conference Room switches shall digitally communicate with the LCS or peer-to-peer to control light fixtures assigned to that switch. The switch shall be able to actuate the following functions based upon the described sequence of operation and intended functions, and interact with its related photo-sensors and occupancy-sensors:
- On
 - Off
 - Dim up
 - Dim down
 - Go to multiple presets
- B. Preset light levels shall be user settable.
- C. Maximum light levels shall be user adjustable for each dimmer.
- D. Where a switch is in a daylighting controls area, then each switch shall override daylighting controls when manually operated.
- E. Switches may be wall mounted push buttons or touch panels.
- F. Color: NEMA WD-1 white, unless indicated otherwise.
- G. Integral Pilot Light or Indicator LED: Indicates that control is active by being on continuously when powered or when pushbuttons are actuated.
- H. Switch faceplates shall be of metal a minimum 1/8th inch thick, finish as designated by Architect and Engineer. Painted finishes shall be matched to sample provided by Architect. Paint to be polyurethane enamel type equal to Polane in quality. Faceplates shall securely attach to their electrical wall box with mechanical fasteners, but without visible screws or fasteners on the face of the switch. The faceplate shall be grounded. Switch shall be capable of withstanding without impairment of function or loss of memory, electrical surges due to static electricity discharge of a user touching the switch, electrical noise and line voltage surges. Switches shall be mounted directly to the metal faceplate or rigid metal subassembly and shall be rated for a minimum 100,000 operations. Buttons supported only by their connection to a printed circuit board or flexible membrane type switches are not acceptable. Faceplates shall be engraved or silk screened with identifying legends as noted in the drawings. Size and style of engraving or silk screening shall be determined by the Architect. Silk screening shall chemically bond to the faceplate so as to resist removal by scratching, cleaning, etc.

3.13 INDOOR PHOTO SENSORS

- A. Manufacturers: Subject to compliance with requirements within the Specification, manufacturers and their product(s) shall be selected by the LCS Supplier.
- B. Photo sensors shall detect changes in ambient lighting level, provide dimming range as required by sequence of operation, and provide feedback on the target illuminance setpoints.
 - 1. The location and number of all photo sensors shall be optimized by the LCS Supplier in accordance with the requirements of the Specification.
 - 2. Ceiling-mounted with range and viewing angle to meet requirements of sequence of operation and Contract Documents. The cone of view shall be limited to 110 degrees (55-degree half angle).
 - 3. The sensor shall incorporate a photodiode to provide light level measurement that can be correlated to the desktop illuminance. The photodiode shall be optically filtered to measure light to closely match the human photopic response.
 - 4. There shall be different photo sensors for different tasks, i.e. skylight, open plan areas, offices, conference rooms, perimeter and other interior spaces as defined in the Contract Documents. Optimize for each application to optimize resolution for the expected range of light.
 - 5. Fully adjustable response in the range between 0 and 250 FC minimum with $\pm 1\%$ accuracy with eight (8) bit minimum resolution at 21°C. The photo sensor shall be demonstrated to be accurate under the following three conditions: (i) 100% electric light, (ii) 100% daylight, and (iii) various combinations of electric light and daylight.
 - 6. All adjustments with exception of sensor range shall be made via the communication line or wireless devices. Units that require the use of unit mounted manual adjustments or which must be programmed at the unit are not acceptable.
 - 7. Resolution enhancement shall be capable of supporting a variety of target set points from 10 FC to 50 FC.
 - 8. The photo sensor output value shall be available for reporting and graphic user interface.
 - 9. Outputs shall be 4-20 mA, 0-10 volts or 8-bit digital.
 - 10. Power supplies shall accept 120vac or 277vac.
 - 11. The photo sensor shall be fully temperature compensated.
 - 12. The photo sensor shall have a cover that protects the photodiode and diffuser from dust.
 - 13. All sensors shall be installed in the 6 inch center plate in the type F1 lighting fixtures. Sensors shall be low profile, flush mounted to the greatest extent possible.
 - 14. The sensor shall communicate with the LCS panels, not directly with the ballasts.
 - 15. The photoelectric device shall be a Class 2, low voltage type.
 - 16. The housing shall be constructed from flame-retardant material and meet UL984 HB standards.

3.14 INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements within the Specification, manufacturers and their product(s) shall be selected by the LCS Supplier.

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B. General Description: Ceiling mounted, solid-state units with direct connection to LCS or separate relay unit.

1. Operation - General

- a. The selection of the type(s) and locations of the occupancy sensors shall be the responsibility of the LCS Supplier.
- b. Manual-on function shall not override occupancy sensor delay timer.
- c. Delay timers shall be adjustable.
- d. All occupancy sensor control functions may be temporarily overridden by network commands.
- e. Occupancy sensors for small zones, i.e. enclosed offices, small conference rooms shall have a manual override switch in the control zone. Refer to the Control Intent Diagrams - Manual DALI Dimming (Wall Box Switch) and Occupancy Control Zones.

2. Operation - Dimming Ballasts:

- a. Refer to the space dimming requirements in the Specification.
- b. Refer to the Control Intent Diagrams - Occupancy Control Zones.
- c. Refer to the Control Intent Diagrams - Manual DALI Dimming (Wall Box Switch) And Occupancy Control Zones.
- d. All operating modes shall be selectable via the communication network using either broadcast or individually addressed command.

3. Operation – Non-dimming Ballasts

- a. When covered area is unoccupied, lights turn off. Lights turn back on when occupancy detected.
- b. Refer to the space dimming requirements in the Specification.
- c. Refer to the Control Intent Diagrams - Occupancy Control Zones.

4. Sensor Output: Direct input to LCS or interface rated to operate the connected relay and complying with UL 773A.

5. Sensor Power: Sensor shall be powered directly from the control system or from the relay unit.

6. Relay Unit: Dry contacts rated for 20A ballast load at 277vac, for 13A tungsten at 120vac, and for 1 hp at 120vac.

7. Device Color unless required otherwise: white.

8. Mounting:

- a. Sensor: Suitable for mounting in a removable 6 inch square plate located in the center of the F1 lighting fixtures.
- b. Relay: Externally mounted though a 1/2-inch knockout in a standard electrical enclosure, concealed in the fixture or ceiling cavity.
- c. Time-Delay and Sensitivity Adjustments: Set via digital communication network.
- d. Settings made via digital network shall be queryable unless accessible through a sensor display.

9. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.

10. Bypass Switch: Override the on function in case of sensor failure.

11. No nuisance outages in occupancy zones shall be accepted by Owner.

C. PIR Type: Ceiling mounted; detect occupancy by sensing a combination of heat and movement in area of coverage.

- a. Detector Sensitivity: Detect occurrences of 6-inch minimum movement of any portion of a human body that presents a target of at least 36 sq. in.

- b. With daylight filter and lens to afford coverage applicable to space to be controlled.
 - c. Detection Coverage (Rooms): Achieve the coverage(s) as described in the Control Intent Diagrams when mounted on a 115-inch high ceiling.
 - d. Detection Coverage (Open Plan Areas): Achieve the coverage(s) as described in the Control Intent Diagrams when mounted on a 115-inch high ceiling.
 - e. Detection Coverage (Corridors): Achieve the coverage(s) as described in the Control Intent Diagrams when mounted on a 115-inch high ceiling.
- D. Ultrasonic Type: Ceiling mounted; detect occupancy by sensing a change in pattern of reflected ultrasonic energy in area of coverage.
 - a. Detector Sensitivity: Detect a person of average size and weight moving at least 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/second.
 - b. Crystal controlled with circuitry that causes no detection interference between adjacent sensors.
 - c. Detection Coverage (Rooms): Achieve the coverage(s) as described in the Control Intent Diagrams when mounted on a 115-inch high ceiling.
 - d. Detection Coverage (Open Plan Areas): Achieve the coverage(s) as described in the Control Intent Diagrams when mounted on a 115-inch high ceiling.
 - e. Detection Coverage (Corridors): Achieve the coverage(s) as described in the Control Intent Diagrams when mounted on a 115-inch high ceiling.
- E. Dual-Technology Type: Ceiling mounted; detect occupancy by using a combination of PIR and ultrasonic or acoustical detection methods in area of coverage. Particular technology or combination of technologies that controls on and off functions shall be selectable in the field by operating controls on unit.
 - a. Sensitivity Adjustment: Separate for each sensing technology.
 - b. Detector Sensitivity: Detect occurrences of 6-inch minimum movement of any portion of a human body that presents a target of at least 36 sq. in., and detect a person of average size and weight moving at least 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
 - c. Detection Coverage (Rooms): Achieve the coverage(s) as described in the Control Intent Diagrams when mounted on a 115-inch high ceiling.
 - d. Detection Coverage (Open Plan Areas): Achieve the coverage(s) as described in the Control Intent Diagrams when mounted on a 115-inch high ceiling.
 - e. Detection Coverage (Corridors): Achieve the coverage(s) as described in the Control Intent Diagrams when mounted on a 115-inch high ceiling.

2.14 LIGHTING NETWORK CONDUCTORS AND CABLES

- A. Low voltage DALI digital network control wire, also called “loop wiring”, shall meet the requirements of the Specification, the local jurisdiction, or LCS Supplier recommendations, whichever is more stringent.
- B. Network wire between fixtures may be free-run Class 2 in accordance with NEC Article 725 and allowed by local jurisdiction.

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- C. Network wire shall be stranded copper cable, plenum rated with yellow jacket and a minimum size of 18 AWG.
- D. Jumpers between fixtures shall plug into a bulkhead type connector mounted in the fixture and be removable.
- E. Homeruns to lighting network power supply shall be run in conduit.
- F. Class 2 Free-Run Control and Sensor Connections: Stranded copper cable, plenum rated with yellow jacket and a minimum size of 18 AWG.
- G. Splices and Taps: Insulation displacement or wire trap connectors shall be used to splice all Class 1 and Class 2 control wiring. Twist-on wire-nut type connectors are not allowed.
- H. A five conductor cable system is required for power and control wiring of all DALI devices. The DALI communication conductors shall be #18 AWG minimum.
- I. Maximum voltage drop of 2 volts from the point of supply to the device.
- J. No wire may exceed 1000 feet in length.
- K. Wire shall be furnished and installed by a separate contractor.
- L. Junction and Mounting Boxes: All ceiling mounted digital control network junction and mounting boxes shall be NEMA deep 4-11/16" with ½" knock-outs unless required otherwise for specific equipment.
- M. Homeruns for emergency lighting circuits shall be kept separate from normal powered lighting circuits.

2.15 ETHERNET LAN

- A. Primary Ethernet LAN: Furnish network receptacles located in each LCS closet, at Lighting System Computer, and as shown on Construction Documents.
- B. Provide and install patch cables and Ethernet switch hubs as required for independent LCS Ethernet LAN.
- C. Provide a TCP/IP modem capable of maintaining a secure and firewall protected Internet connection using VPN or equivalent protocol acceptable to Owner.

2.16 SPACE DIMMING SCHEDULE & LIGHTING CONTROL SEQUENCES

- A. Non-dimming spaces, **lighting control sequence #1**: lights are off when the space is unoccupied, as occupancy is registered the lights turn on to 100%. As the space is evacuated, when no occupancy is detected the lights turn off after a pre-specified delay.
Refer to Control Intent Diagrams:
 - i. Occupancy Control Zones
 - 1. 3rd Floor East, CSK-1
 - 2. 3rd Floor West, CSK-1
 - 3. 13th Floor, CSK-1
 - 4. 14th Floor, CSK-2
 - 5. 15th Floor, CSK-2
 - 6. 19th Floor, CSK-1
 - ii. Typical Emergency Fixtures
 - 1. 3rd Floor East, CSK-5
 - 2. 3rd Floor West, CSK-5
 - 3. 13th Floor, CSK-5
 - 4. 19th Floor, CSK-5

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1. Cellar Mailroom – occupancy sensor, no dimming
 2. Photo archives - occupancy sensor, no dimming
 3. Cold storage – occupancy sensor, no dimming
 4. Elevator lobby – occupancy sensor, the fluorescent ceiling mounted light shall be on the emergency/night-light scheme, no dimming
 5. Service corridors – occupancy sensor, one fixture on the emergency/night-light scheme, no dimming
 6. Privacy rooms - occupancy sensor, one fixture on the emergency/night-light scheme, no dimming
 7. Copy rooms, Equipment Rooms, Support Rooms, and lockable closets- occupancy sensor, one fixture on the emergency/night-light scheme, no dimming
 8. File rooms - occupancy sensor, one fixture on the emergency/night-light scheme, no dimming
 9. Technology rooms (IDF closets) - occupancy sensor, one fixture on the emergency/night-light scheme, no dimming
 10. Vending machine areas – occupancy sensor and one light on the emergency/night-light scheme, no dimming
 11. Pantries – occupancy sensor, one light on the emergency/night-light scheme, no dimming
 12. Toilets - occupancy sensor, two lights on the emergency/night scheme, no dimming
- B. Dimming with switches, no daylight control, **lighting control sequence #2**: sequence is lights are off when the room is unoccupied, as occupancy is registered the lights turn on to 70%. At any time the lights may be manually controlled by the occupant(s) from the wall mounted dimming switch with presets. As the room is evacuated, when no occupancy is detected the lights turn off after a pre-specified delay. It is not necessary for the last person out of the room to manually turn off the lights even if the lights were manually controlled during occupancy. Refer to Control Intent Diagrams:
- i. Occupancy Control Zones
 1. 3rd Floor East, CSK-1
 2. 3rd Floor West, CSK-1
 3. 13th Floor, CSK-1
 4. 14th Floor, CSK-2
 5. 15th Floor, CSK-2
 6. 19th Floor, CSK-1
 - ii. Manual DALI Dimming (Wall Box Switch) And Occupancy Control Zones
 1. 3rd Floor East, CSK-3
 2. 3rd Floor West, CSK-3
 3. 13th Floor, CSK-3
 4. 19th Floor, CSK-3
 - iii. Typical Emergency Fixtures
 1. 3rd Floor East, CSK-5
 2. 3rd Floor West, CSK-5
 3. 13th Floor, CSK-5
 4. 19th Floor, CSK-5
1. Conference rooms in the open plan areas – occupancy sensor with manual override wall mounted dimming switch with multiple presets
 2. Training rooms (except on 15th floor) - occupancy sensor with manual override wall mounted dimming switch with multiple presets

3. Libraries (except on the 28th floor) – occupancy sensors and manually operated wall mounted dimming switch with multiple presets, one fixture on the emergency/night-light scheme
 4. Pulitzer project room – occupancy sensor and manually operated wall mounted dimming switch with multiple presets, one fixture on the emergency/night-light scheme
 5. Offices in open plan areas – occupancy sensor, manual override wall mounted dimming switch with multiple presets, auto-restore to the last setting upon reentry
 6. Exam rooms - occupancy sensor, manually operated dimming switch with multiple presets, one fixture on the emergency/night-light scheme
 7. WQXR studios - occupancy sensor with manual override wall mounted dimming switch with multiple presets, one fixture on the emergency/night-light scheme
- C. Dimming, daylight control with manual override switches, **lighting control sequence #3**: sequence is lights are off when the room is unoccupied, as occupancy is registered the lights turn on based upon daylight available. At any time the lights levels may be controlled by the occupant(s) at the wall mounted dimming switch. The manual dimming switch overrides the daylight control scheme. As the room is evacuated, when no occupancy is detected the lights go out after a pre-specified delay. It is not necessary for the last person out of the room to manually turn off the lights even if the lights were manually controlled during occupancy. Refer to Control Intent Diagrams:
- i. Manual DALI Dimming (Wall Box Switch), Daylight Sensor (Photocell) And Occupancy Control Zones
 1. 13th Floor, CSK-6
 2. 15th Floor, CSK-3
 - ii. Typical Emergency Fixtures
 1. 3rd Floor East, CSK-5
 2. 3rd Floor West, CSK-5
 3. 13th Floor, CSK-5
 4. 19th Floor, CSK-5
1. Conference rooms on the perimeter – occupancy sensor, daylighting dimmable controls via independent DALI zone(s) with manual override wall mounted dimming switch with multiple presets
 2. Offices on the perimeter – occupancy sensor, daylighting dimmable controls via independent DALI zone with manual override wall mounted dimming switch with multiple presets
 3. Executive offices - occupancy sensor, daylighting dimmable controls via independent DALI zone with manual override wall mounted dimming switch with multiple presets
 4. Network Operations Center on the 12th floor - occupancy sensor, daylighting dimmable controls via independent DALI zone with manual override wall mounted dimming switch with multiple presets, three fixtures on the emergency/night-light scheme
 5. Physical therapy room on the perimeter - occupancy sensor, daylighting dimmable controls via independent DALI zone with manual override wall mounted dimming switch with multiple presets, one fixture on the emergency/night-light scheme
 6. Library on the 28th floor - occupancy sensor, daylighting dimmable controls via independent DALI zone(s) with manual override wall mounted dimming switch with multiple presets, one fixture on the emergency/night-light scheme
 7. Private dining rooms - daylighting dimmable controls via independent DALI zone with manual override wall mounted dimming switch with multiple presets

8. Training rooms on the 15th floor - daylighting dimmable controls via independent DALI zone with manual override wall mounted dimming switch with multiple presets
 9. Boardroom - occupancy sensor, daylighting dimmable controls via independent DALI zone with manual override wall mounted dimming switch with multiple presets
- D. Dimming, automatic daylight control, no dimming switches or manual override switches, **lighting sequence #4**: sequence is lights are off when the occupancy zone is unoccupied, as occupancy is registered the lights turn on in all daylight zones within the occupancy zone based upon daylight available. The target set point illuminance level at the work plane (29.5" above finished floor) is maintained as a minimum by adding electric light output to whatever daylight is available. When sufficient daylight is available to achieve the target set point or more than enough daylight is available, then the light fixtures in that daylight zone(s) shall be off. At night the light fixture output levels shall achieve the target set point illuminance level at the work plane. There simply will not be any daylight contribution. As the open plan area various occupancy zones are evacuated, when no occupancy is detected the lights go out after a pre-specified delay. Refer to the Control Intent Diagrams:
- i. Occupancy Control Zones
 1. 3rd Floor East, CSK-1
 2. 3rd Floor West, CSK-1
 3. 13th Floor, CSK-1
 4. 19th Floor, CSK-1
 - ii. Daylight DALI Dimming Zones
 1. 3rd Floor East, CSK-2
 2. 3rd Floor West, CSK-2
 3. 13th Floor, CSK-2
 4. 19th Floor, CSK-2
 - iii. Typical Emergency Fixtures
 1. 3rd Floor East, CSK-5
 2. 3rd Floor West, CSK-5
 3. 13th Floor, CSK-5
 4. 19th Floor, CSK-5
1. Open work plan areas – daylighting dimmable controls via multiple DALI daylight control zones, with multiple fixtures on the emergency/night-light scheme
 2. Data Center server rack area on the 12th floor - daylighting dimmable controls via multiple DALI daylight control zones, with multiple fixtures on the emergency/night-light scheme.
- E. Dimming without switches, no daylight control, **lighting sequence #5**: sequence is lights are off when the corridor is unoccupied, as occupancy is registered the lights in the corridor turn on to the output level based upon the pre-specified target set point. Refer to Control Intent Diagrams:
- i. Occupancy Control Zones
 1. 3rd Floor East, CSK-1
 2. 3rd Floor West, CSK-1
 3. 13th Floor, CSK-1
 4. 19th Floor, CSK-1
 - ii. Typical Emergency Fixtures
 1. 3rd Floor East, CSK-5

2. 3rd Floor West, CSK-5
 3. 13th Floor, CSK-5
 4. 19th Floor, CSK-5
1. Core corridors – each corridor is an independent DALI zone on its own target set point with multiple fixtures on the emergency/night-light scheme
- F. Non-dimming, time clock control only, **lighting sequence #6**: sequence is lights come on at 100% at sunset, the lights turn off at 1:00 am, the lights come back on at 100% one hour before sunrise and go off at sunrise. Refer to Control Intent Diagrams:
- i. Time Clock Control Zones
 1. 3rd Floor East, CSK-4
 2. 3rd Floor West, CSK-4
 3. 13th Floor, CSK-4
 4. 19th Floor, CSK-4
 1. Perimeter cove architectural lighting on floors 2 through 28 inclusive. Refer to the Control Intent Diagrams – Time Clock Control Zones.
- G. Conference Center – **lighting sequence #7**, preset dimming control system for the Conference Center shall meet or exceed the following capabilities:
1. Refer to Control Intent Diagram: 15th FL Control Diagram, CSK-1
 2. There are 3 conference rooms that can combined in six different space scenarios. These include: 3 individual conference rooms, all 3 rooms combined as one, and two different combinations of two rooms combined as a double.
 3. System shall be configured such that the touch screen control station in each of the 3 conference rooms can operate as the master control station.
 4. Door switches or infrared connectivity between control stations shall determine the room configurations. These shall be inputs to the system.
 5. Depending upon room size (conference center walls are removable) there shall be a number of spaces to be selected at the touch screen control stations. Each selectable room shall have four preset scenes and on/off for up to 8 control zones. The touch screen control station in each room shall only be able to control the zones in its configured space.
 6. One raise/lower switch with visual display shall be available for each zone.
 7. A temporary master raise/lower switch shall move all light levels up or down.
 8. System shall have smooth fade mode. Switching time between scenes shall be adjustable from 1 second to 5 minutes.
 9. A temporary zone override shall be provided.
 10. Multiple touch screen control stations shall be capable of activating each of the preset scenes and shall not interfere with each other.
- H. Cafeteria – **lighting sequence #8**, preset dimming control system for the cafeteria shall meet or exceed the following capabilities:
1. Refer to Control Intent Diagram: 14th FL Control Diagram
 2. System shall have four preset scenes and on/off for up to 13 control zones.
 3. System shall be mountable in a standard 2, 3, or 4 gang metal wall box.
 4. One master raise/lower dimming switch with visual display shall be available and connected to all 13 zones.

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5. System shall have smooth fade mode. Switching time between scenes shall be adjustable from 1 second to 5 minutes.
 6. A temporary zone override shall be provided.
 7. The 13 zones cover the cafeteria seating area and servery on the 14th floor and the cafeteria balcony on the 15th floor.
- I. Special conference rooms with audio visual connectivity – audio visual equipment interface for manual dimming and preset control. This is overlaid on top of typical lighting sequence #3 including dimming and daylight control with manual override wall box dimming switches, **lighting sequence #9**: sequence is lights are off when the room is unoccupied, as occupancy is registered the lights turn on based upon daylight available. At any time the lights levels may be controlled by the occupant(s) at the wall mounted dimming switch. The manual dimming switch overrides the daylight control scheme. As the room is evacuated, when no occupancy is detected the lights go out after a pre-specified delay. It is not necessary for the last person out of the room to manually turn off the lights even if the lights were manually controlled during occupancy. Refer to Control Intent Diagrams:
- i. Manual DALI Dimming (Wall Box Switch), Daylight Sensor (Photocell) And Occupancy Control Zones
 1. 3rd Floor West, CSK-3
 2. 15th Floor, CSK-1
1. Page One conference room on 3rd floor
 2. Conference Center - 3 main room on the west side of the 15th floor

PART 4 - EXECUTION

4.1 EXAMINATION

A. FIELD QUALITY CONTROL

1. LCS Supplier Field Service: Provide factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and assist with field testing. Report results in writing.
2. Perform the following field tests and inspections and prepare test reports:
 - a. Complete installation and start-up checks according to manufacturer's written instructions.
 - b. Test for circuit continuity, open, shorts and other tests recommended by the manufacturer.
 - c. Check operation of local control devices.
 - d. Verify that the control system features are operational.
 - e. Test system diagnostics by simulating improper operation of several components selected by Owner/Architect/Engineer.
 - f. After installing sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - g. Operational Test: Verify actuation of each sensor and adjust time delays.
 - h. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:
 - i. Continuity tests of circuits.
 - ii. Operational Tests: Set and operate controls at PC workstations and at monitored and controlled devices to demonstrate their functions and capabilities. Use a methodical sequence that cues and reproduces actual operating functions as recommended by the manufacturer. Note response to each test command and operation
 - i. Remove and replace lighting control devices where test results indicate that they do not comply with specified requirements.
 - j. Correct deficiencies, make necessary adjustments, and retest. Verify that specified requirements are met.
 - k. Reports: Prepare written reports of tests, inspections, verifications and observations indicating and interpreting results. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.
 - l. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - m. Verify normal operation of each fixture after installation.
 - n. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify normal transfer to backup source and retransfer to normal.
 - o. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

4.2 TRAINING

- A. A trainer shall be provided by the LCS Supplier to train Owner's maintenance personnel to adjust, operate and maintain the LCS and all of its components.
- B. The minimum of 40 hours training session shall be provided and shall include:
 - 1. General description of the system and operational functions of its components.
 - 2. Hands on training for each of the hardware components (performance, maintenance, repair, part replacement)
 - 3. Hands on software training (programming, operation, modem connection)
 - 4. At least two Owner representatives, two representatives from the electrical maintenance group and two representatives from the Engineer shall be present for the training.
 - 5. Manufacturer shall provide a minimum of 6 complete operation manuals for use during the training session.
 - 6. The System Administrator training shall be carried out in a separate one-on-one session.
- C. Train Owner's management and maintenance personnel in interpreting and using monitoring displays and in configuring and using software and reports. Train them in troubleshooting, servicing, adjusting, and maintaining equipment.
- D. Training Aid: Use the approved final versions of software and maintenance manuals as training aids.
- E. Schedule training with Owner with at least thirty days advance notice.

4.3 ON-SITE ASSISTANCE

- A. Occupancy Adjustments: Within one year of date of Final Acceptance, provide up to three Site visits, when requested by Owner, to adjust and calibrate components and to assist Owner's personnel in making program changes and in adjusting sensors and controls to suit actual conditions.
- B. Post Occupancy Evaluation: one year after the date of Final Acceptance, provide an evaluation of the system using trend reports, energy usage and system failure reports.

4.4 OFF-SITE TECHNICAL SUPPORT

- 1. Hardware and Software: For the entire System Warranty Period, provide unlimited response to Owner questions regarding software use and hardware and communication link troubleshooting, reconfiguring, and adjusting.
- 2. Availability: Eight hours per day, weekdays.
- 3. Responder Qualifications: Engineer or technician thoroughly familiar with the LCS.
- 4. Provide telephone, Internet, or other communication connection that allows off-site query, troubleshooting, control, monitoring, and configuration of the system by an authorized off-site technician.
- 5. Communication channel shall be provided by Owner.

4.5 SYSTEM COMMISSIONING

- A. The LCS shall be commissioned on a floor by floor basis and then finally as an entire system.
- B. Final Acceptance of the LCS shall be contingent upon successful commissioning of each floor and the entire system.
- C. As the LCS installation is completed on individual floors by the Electrical Installation Contractor, a partial system start up, testing and commissioning plan shall be implemented by the LCS Supplier factory-trained engineer(s).
- D. Upon completion of the entire LCS installation by the Electrical Installation Contractor, the system shall then be commissioned by the LCS Supplier as a whole system. The commissioning will be performed upon notification by the Electrical Installation Contractor that the system installation is complete and that all loads have been tested live for continuity and freedom from defects and that all control wiring has been connected and checked for proper continuity. The LCS Supplier shall perform supervisory functions during the Electrical Installation Contractor final checkout.
- E. The LCS Supplier shall provide the Owner, Architect and Engineer with ten working days advance notice of the scheduled final commissioning start date.
- F. Upon completion of the final system checkout, the LCS Supplier shall demonstrate the functionality of the LCS to the Owner.
- G. The LCS Supplier shall demonstrate the operation of the LCS to the Owner. Each lighting sequence shall be fully demonstrated to be in accordance with the Specification.
- H. The LCS Supplier shall demonstrate the reliability of the LCS to the Owner. Compliance with the Specification shall be demonstrated over a 30 day test period.
- I. The LCS Supplier shall demonstrate the flexibility of the LCS to the Owner. Rezoning of daylight zones and independent zones shall be demonstrated solely with the use of the PC/console. No physical wiring may be moved, added or removed during these demonstrations.
- J. The LCS Supplier shall demonstrate the self diagnostics and self-corrective features of the LCS to the Owner.
- K. The LCS Supplier shall demonstrate the emergency lighting and night-light features of the LCS to the Owner. A power outage shall be scheduled during this part of the commissioning program.
- L. The LCS Supplier shall demonstrate the occupancy zone integrity of the LCS to the Owner.
- M. The LCS Supplier shall demonstrate full reporting capabilities and system refresh rate of 30 seconds or less.
- N. During commissioning the following shall be measured to determine system performance:
 - 1. Work plane illuminance for various target set points in the open plan areas at any work stations in the daylighting zones as selected by Owner
 - 2. Luminance at the interior of the perimeter window wall
 - 3. Lighting system energy usage
- O. The LCS Supplier shall correlate daylight dimming with natural light levels.
- P. System must be demonstrated to perform 90% of the time in accordance with work plane illuminance targets under daylight conditions over a 30 day test period.

SECTION 16575 – LIGHTING CONTROLS SYSTEM

- Q. Final commissioning shall be completed prior to The New York Times first move-in date.

PART 5 - LIGHTING SEQUENCES AND CONTROL INTENT DIAGRAMS

4.1 Lighting sequences

- A. Exterior lighting – there shall be no exterior lighting controlled by the LCS.
- B. Normal business hours are defined as follows:
 - 1. Monday – Friday: 7 AM – 10 PM
 - 2. Saturday, Sunday and Holidays: 8 AM – 5 PM
 - 3. Newsroom business hours are distinct and shall be programmed separately by floor (this applies to floors 2 through 7 inclusive)
- C. Lighting sequences – there are eight distinct lighting sequences. Each sequence shall apply to one or more spaces as defined in the Space Dimming Schedule in paragraph 2.16 of the Specification.

4.2 Control Intent Diagrams

- 1. CSK-1, 19th Floor, Control Intent Diagram, Occupancy Control Zones
- 2. CSK-2, 19th Floor, Control Intent Diagram, Daylight DALI Dimming Zones
- 3. CSK-3, 19th Floor, Control Intent Diagram, Manual DALI Dimming (Wall Box Switch) And Occupancy Control Zones
- 4. CSK-4, 19th Floor, Control Intent Diagram, Time Clock Control Zones
- 5. CSK-5, 19th Floor, Control Intent Diagram, Typical Emergency Fixtures
- 6. CSK-1, 13th Floor, Control Intent Diagram, Occupancy Control Zones
- 7. CSK-2, 13th Floor, Control Intent Diagram, Daylight DALI Dimming Zones
- 8. CSK-3, 13th Floor, Control Intent Diagram, Manual DALI Dimming (Wall Box Switch) And Occupancy Control Zones
- 9. CSK-4, 13th Floor, Control Intent Diagram, Time Clock Control Zones
- 10. CSK-5, 13th Floor, Control Intent Diagram, Typical Emergency Fixtures
- 11. CSK-6, 13th Floor, Control Intent Diagram, Manual DALI Dimming (Wall Box Switch), Daylight Sensor (Photocell) And Occupancy Control Zones
- 12. CSK-1, 3rd Floor West, Control Intent Diagram, Occupancy Control Zones
- 13. CSK-2, 3rd Floor West, Control Intent Diagram, Daylight DALI Dimming Zones
- 14. CSK-3, 3rd Floor West, Control Intent Diagram, Manual DALI Dimming (Wall Box Switch) And Occupancy Control Zones
- 15. CSK-4, 3rd Floor West, Control Intent Diagram, Time Clock Control Zones
- 16. CSK-5, 3rd Floor West, Control Intent Diagram, Typical Emergency Fixtures
- 17. CSK-1, 3rd Floor East, Control Intent Diagram, Occupancy Control Zones
- 18. CSK-2, 3rd Floor East, Control Intent Diagram, Daylight DALI Dimming Zones
- 19. CSK-3, 3rd Floor East, Control Intent Diagram, Manual DALI Dimming (Wall Box Switch) And Occupancy Control Zones
- 20. CSK-4, 3rd Floor East, Control Intent Diagram, Time Clock Control Zones
- 21. CSK-5, 3rd Floor East, Control Intent Diagram, Typical Emergency Fixtures
- 22. CSK-1, 14th Floor, 14th FL Control Diagram
- 23. CSK-1, 15th Floor, 14th FL Control Diagram
- 24. CSK-2, 14th & 15th Floor, 14th & 15th FL Control Load Schedule

PART 6 - COLLEGE POINT MOCK UP

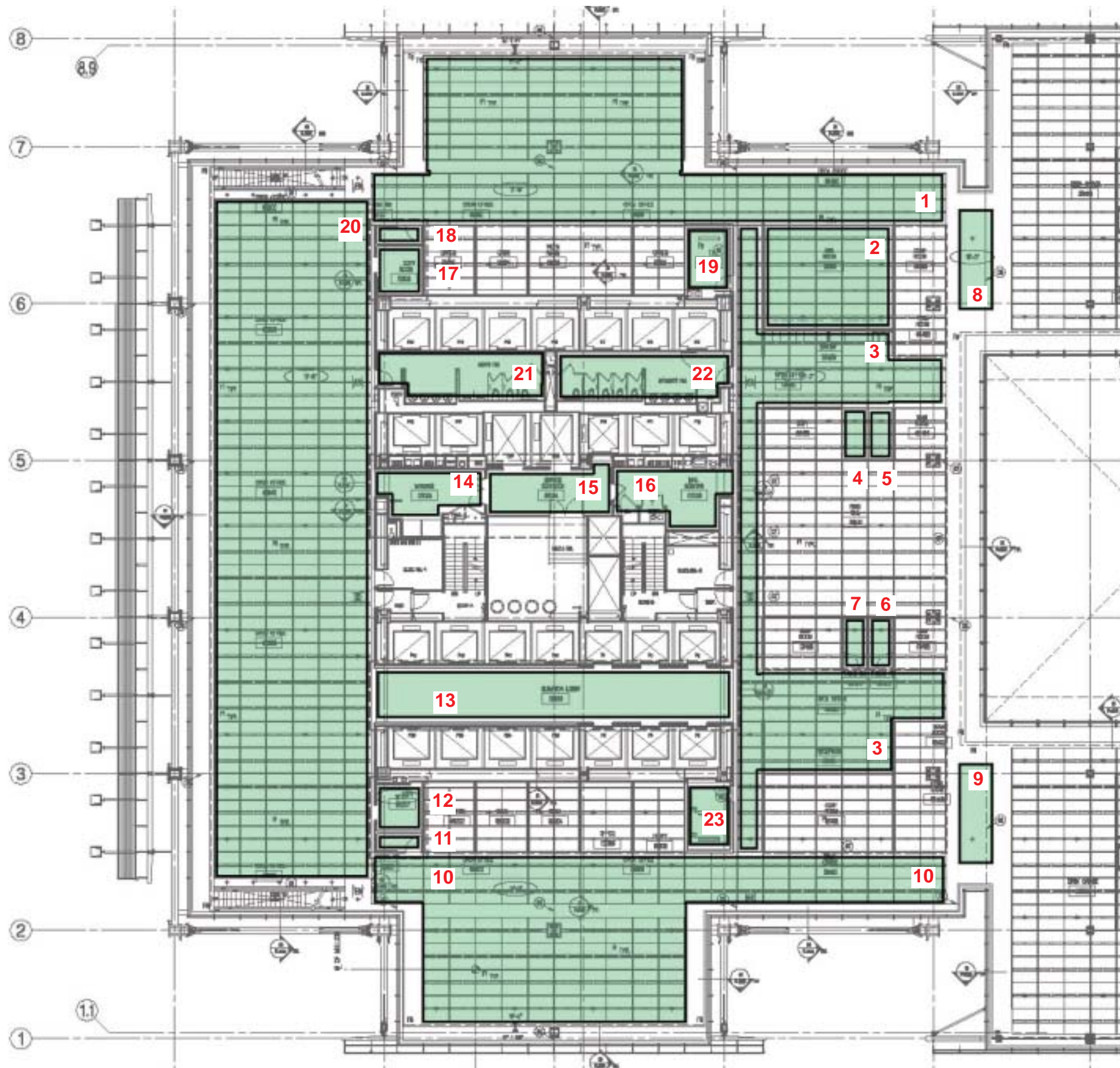
- 6.1** Manufacturer shall support a comprehensive lighting and shade control system in the mock up at College Point. The mock up is a replica of the southwestern corner of a typical floor of the The New York Times Headquarters Building as designed by Renzo Piano Building Workshop and Gensler.
- A. Owner shall provide electrical installation services for the mock up lighting control system.
 - B. LCS Supplier shall furnish all lighting control components including, but not limited to: central control panel(s), distributed control units, photo sensors, occupancy sensors, PC, software and hardware with lighting control program.
 - C. DALI ballasts, lighting fixtures, shades and shade control system shall be furnished by others.
- 6.2** MOCK UP SCHEDULE
- A. Delivery of lighting control system components for electrical subcontractor installation by January 4, 2005.
 - B. System PC installation by LCS Supplier by January 17, 2005.
 - C. Initial commissioning of the LCS by January 21, 2005.
 - D. Continuing commissioning efforts and system refinements through May 31, 2005.

SECTION 16575 – LIGHTING CONTROLS SYSTEM

PART 7 - ALTERNATES

- 7.1** Provide add alternate for extended warranty for additional one year, two years and three years.

END OF SECTION 16575



 OCCUPANCY CONTROL ZONES

LIGHTING SEQUENCE
#1,#3, #4,#5

TOTAL OF 23 ZONES

OCCUPANCY CONTROL ZONES



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22 West 19th Street New York, NY
11001

Interior Architect
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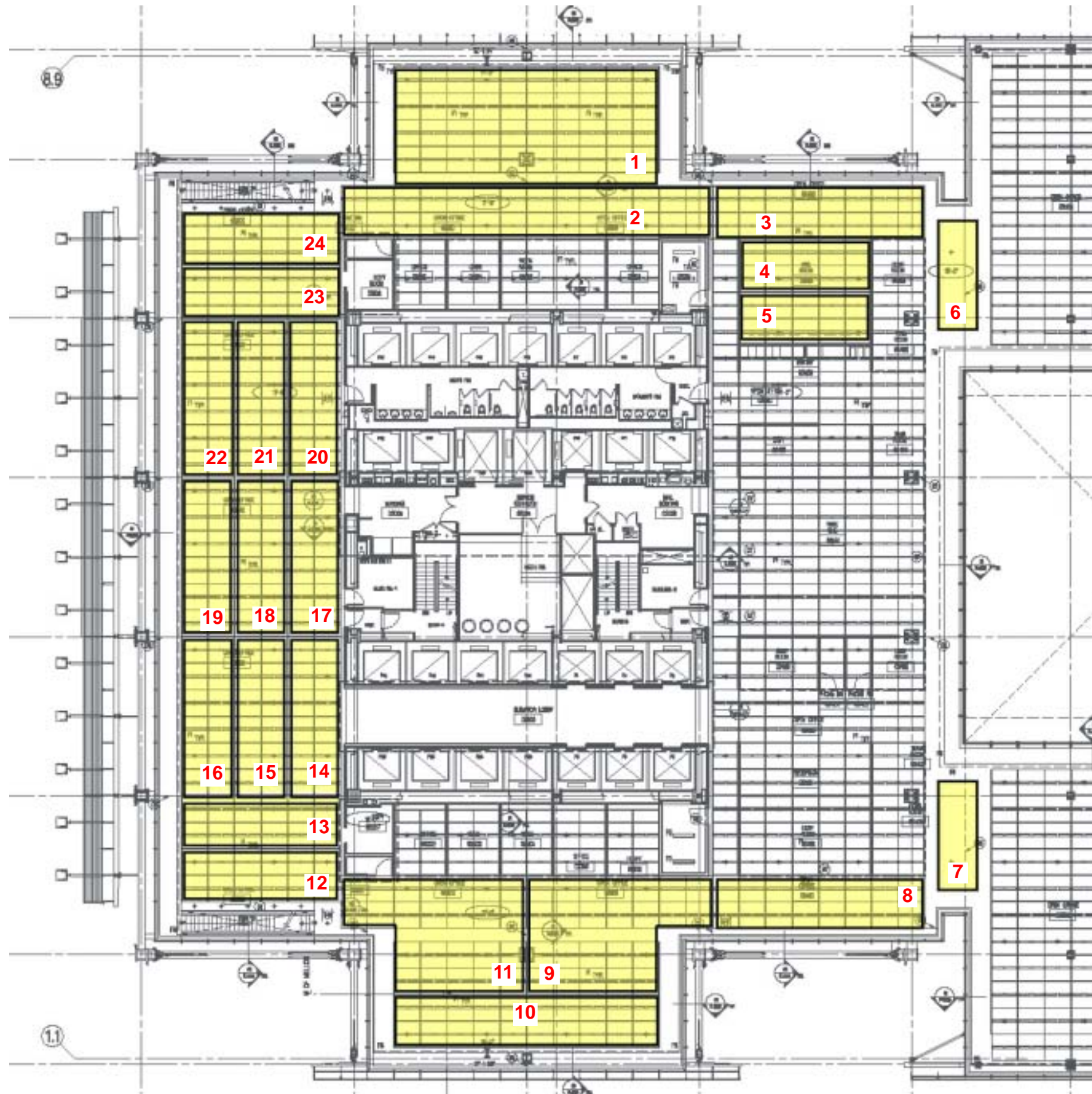
LIGHTING DESIGN

**3rd Floor
West**

Sept. 22nd, 2004

Control Intent
Diagram

CSK-1



LIGHTING SEQUENCE #3, #4
TOTAL OF 24 ZONES

DAYLIGHT DALI DIMMING ZONES



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11001

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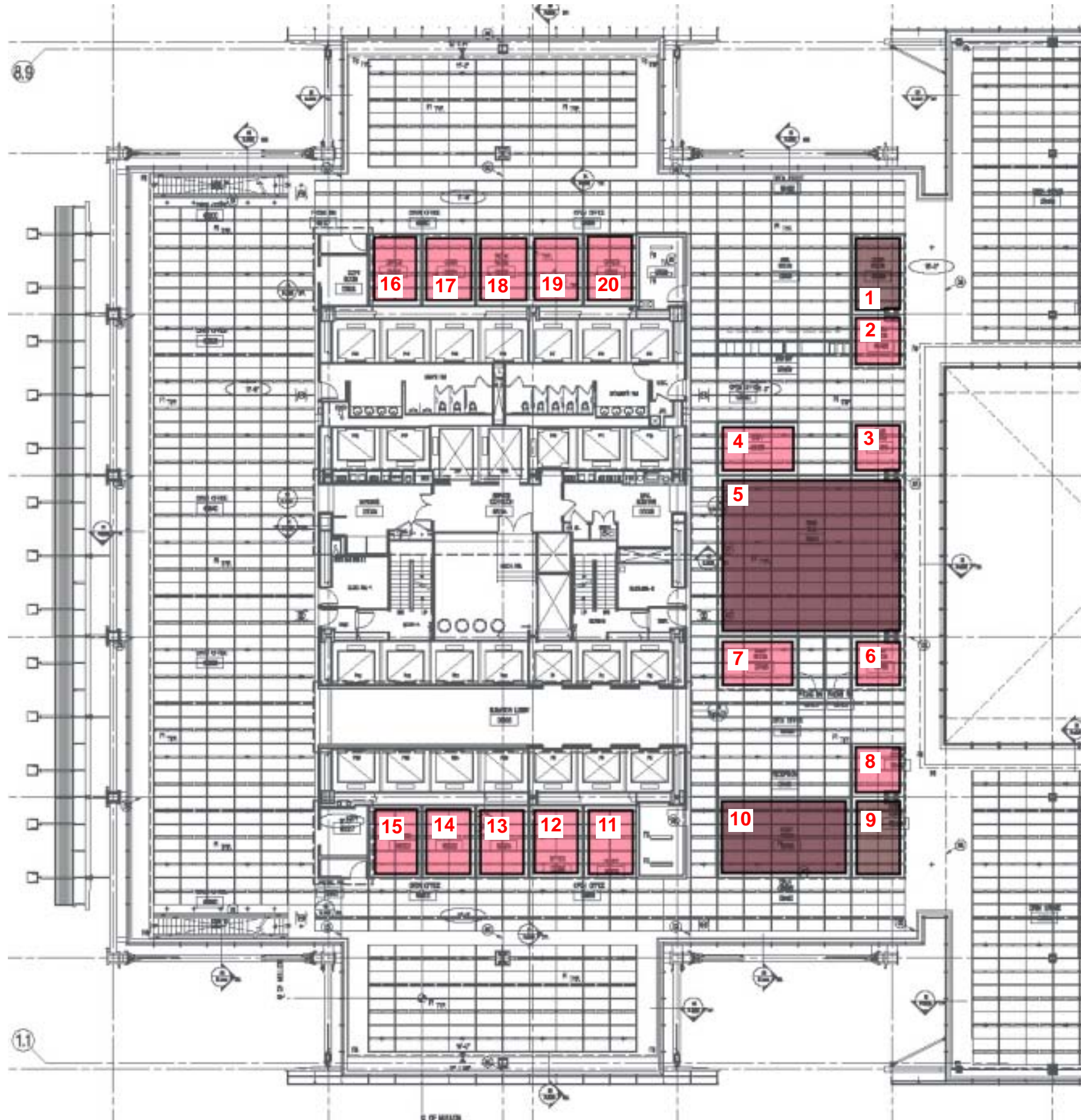
LIGHTING DESIGN

**3rd Floor
West**

Sept. 22nd, 2004

Control Intent
Diagram

CSK-2



WITH MULTIPLE PRESET
DIMMER CONTROL
LIGHTING SEQUENCE #9

TOTAL OF 20 ZONES
LIGHTING SEQUENCE #2, #3, #9

**MANUAL DALI DIMMING
(WALL BOX SWITCH) AND
OCCUPANCY CONTROL
ZONES**

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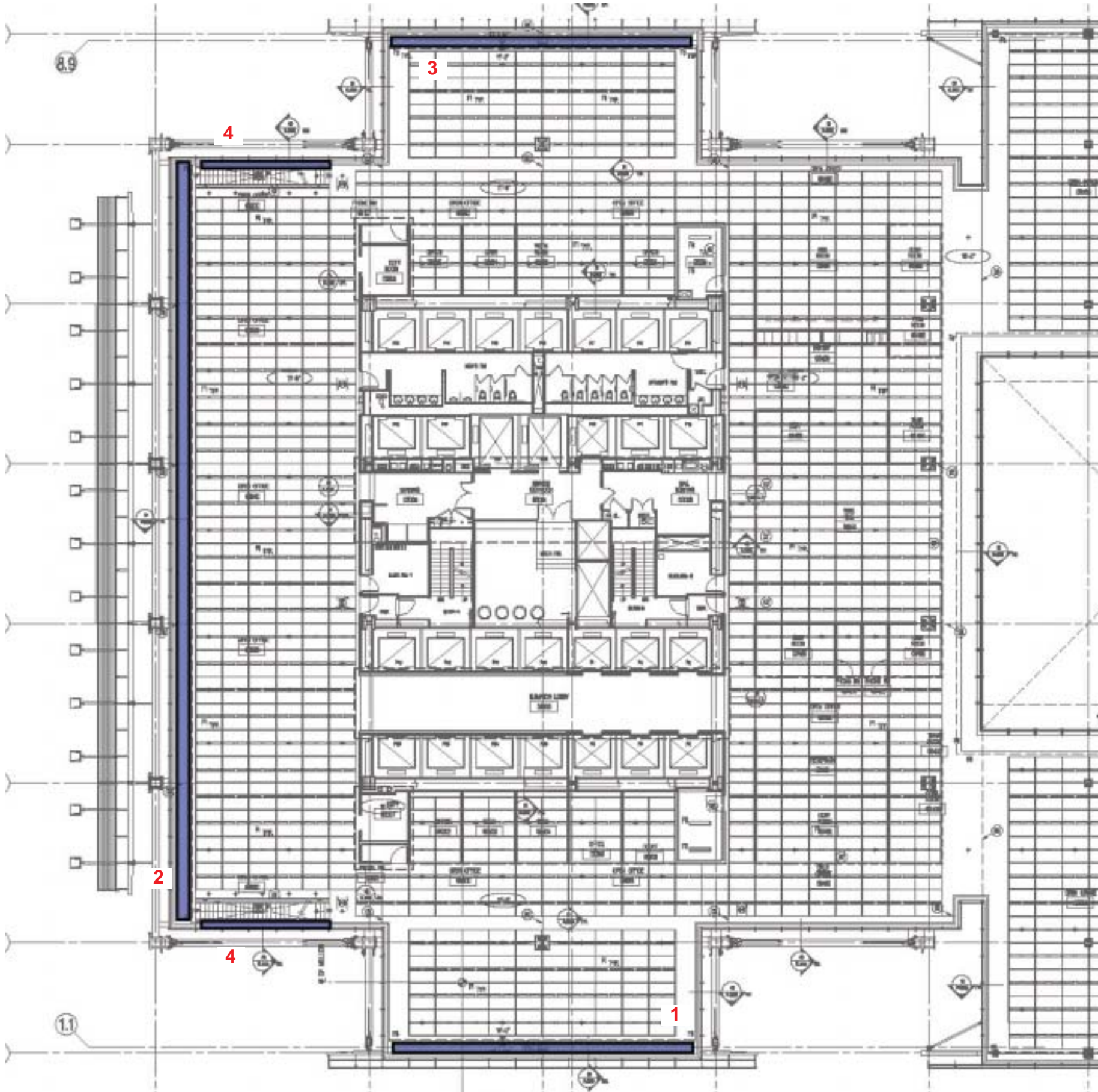
LIGHTING DESIGN

**3rd Floor
West**

Sept. 22nd, 2004

Control Intent
Diagram

CSK-3



LIGHTING SEQUENCE #6
TOTAL OF 4 ZONES

TIME CLOCK CONTROL ZONES



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Architect
RENZO PIANO BUILDING WORKSHOP
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FOX & FOWLE ARCHITECTS, P.C.
22 West 19th Street New York, NY
11001

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LIGHTING DESIGN

3rd Floor West

Sept. 22nd, 2004

Control Intent
Diagram

CSK-4



**OCCUPANCY
CONTROL
ZONES**

**LIGHTING SEQUENCES
#1,#3,#4,#5**

TOTAL OF 13 ZONES

OCCUPANCY CONTROL ZONES

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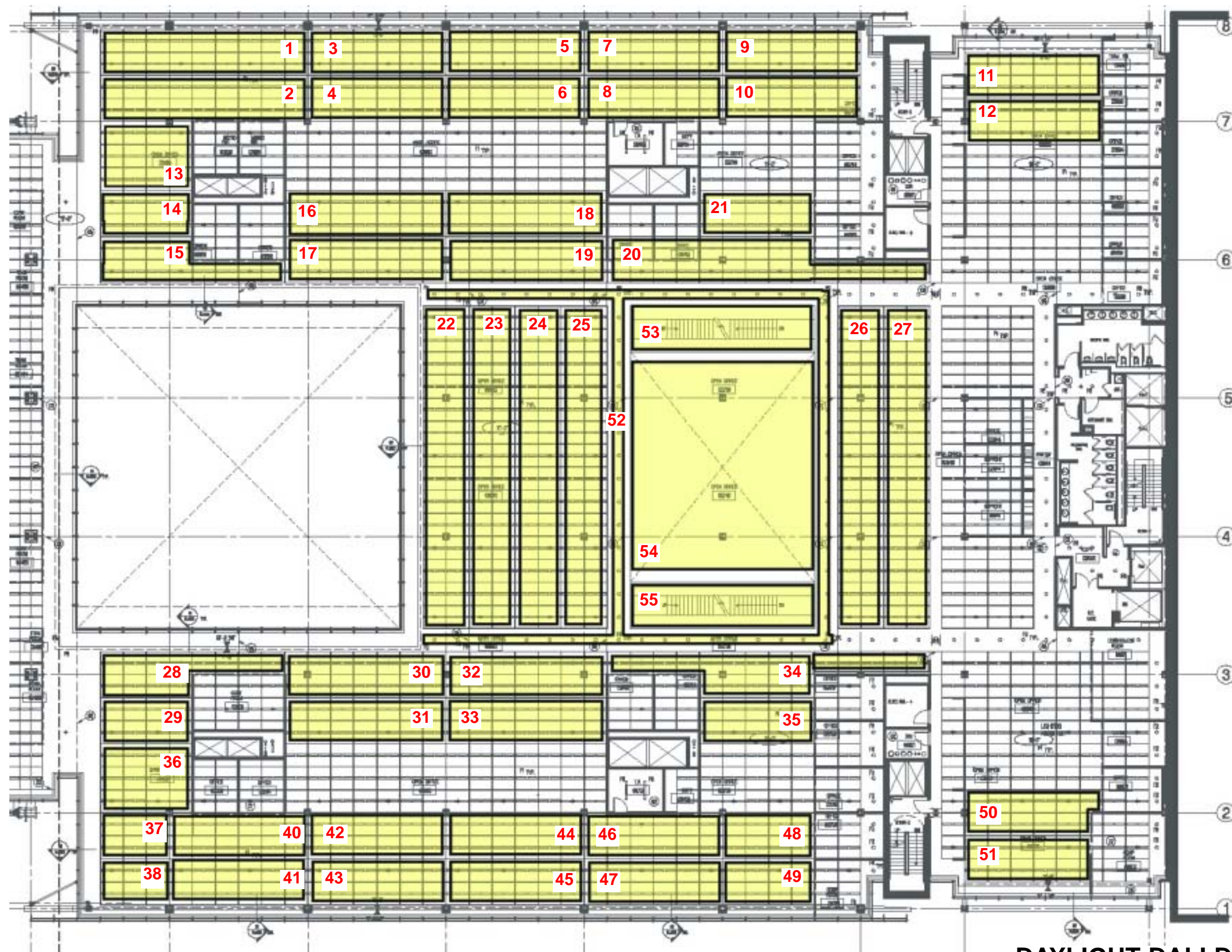
LIGHTING DESIGN

**3rd Floor
East**

Sept. 22nd, 2004

Control Intent
Diagram

CSK-1



DAYLIGHT DALI DIMMING ZONES

LIGHTING SEQUENCES
#3, #4

TOTAL OF 55 ZONES

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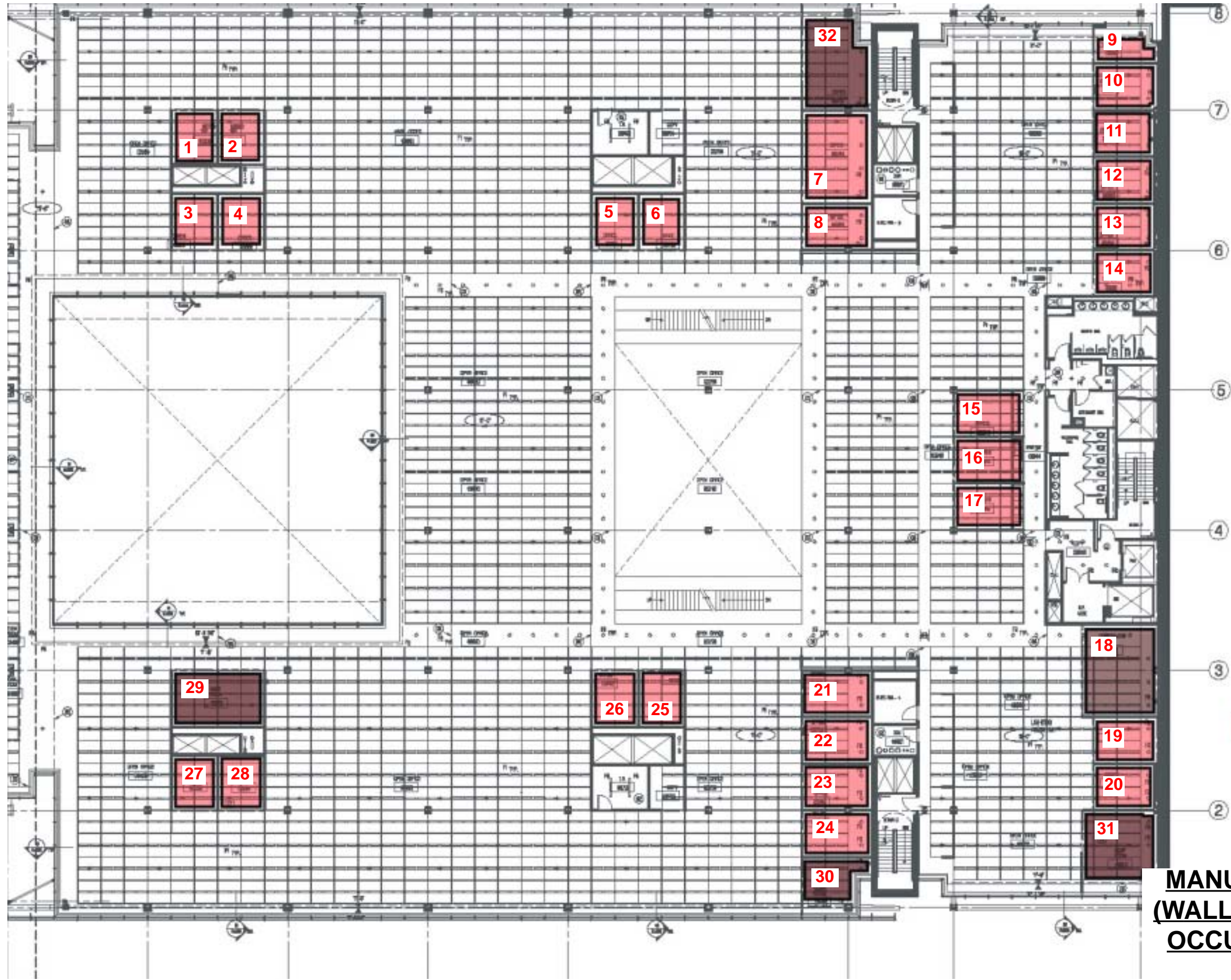
LIGHTING DESIGN

**3rd Floor
East**

Sept. 22nd, 2004

Control Intent
Diagram

CSK-2



WITH MULTIPLE PRESET
DIMMER CONTROL

TOTAL OF 32 ZONES
LIGHTING SEQUENCE #2,#3

**MANUAL DALI DIMMING
(WALL BOX SWITCH) AND
OCCUPANCY CONTROL
ZONES**



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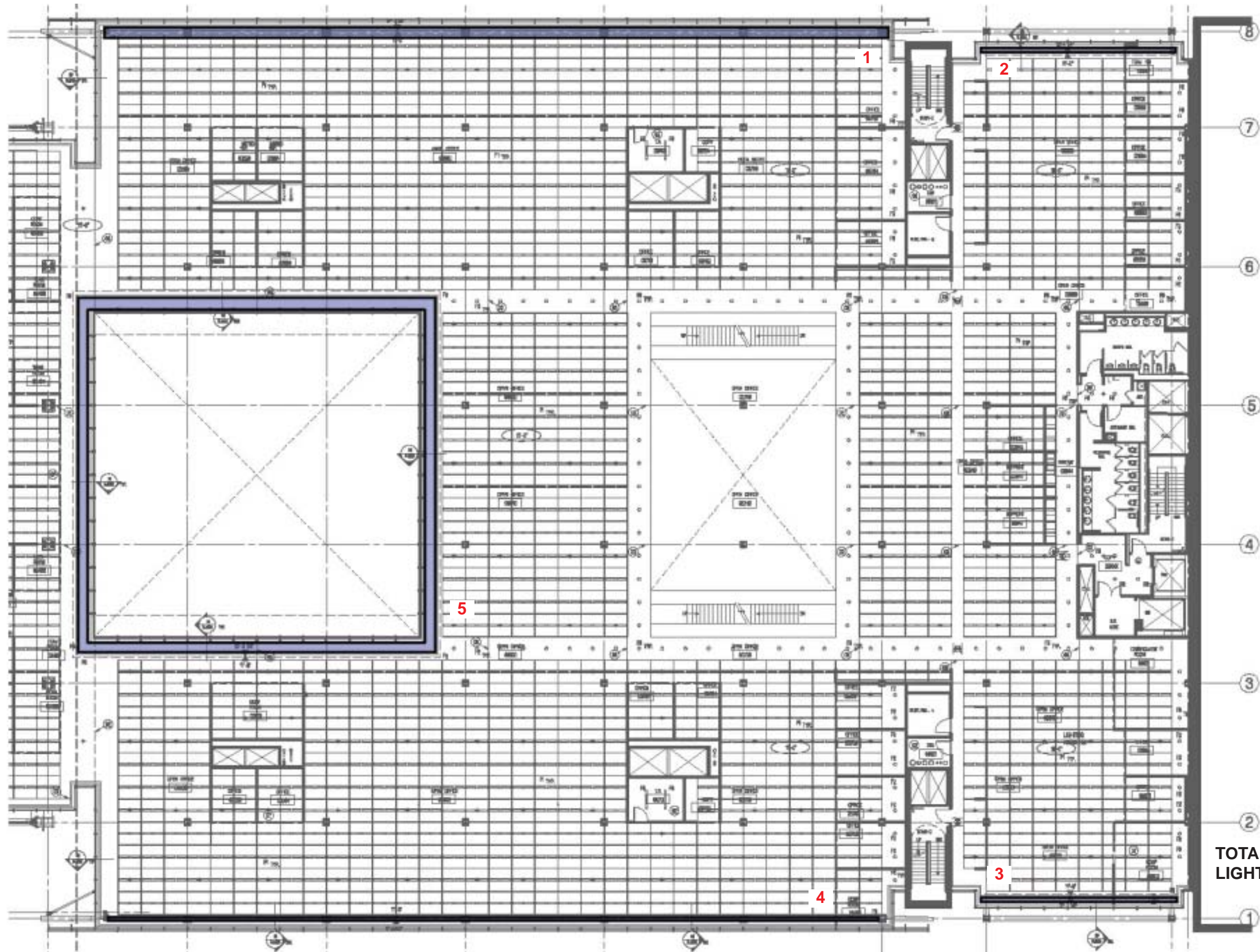
LIGHTING DESIGN

**3rd Floor
East**

Sept. 22nd, 2004

Control Intent
Diagram

CSK-3



TIME CLOCK CONTROL ZONES

**TOTAL OF 5 ZONES
LIGHTING SEQUENCE #6**



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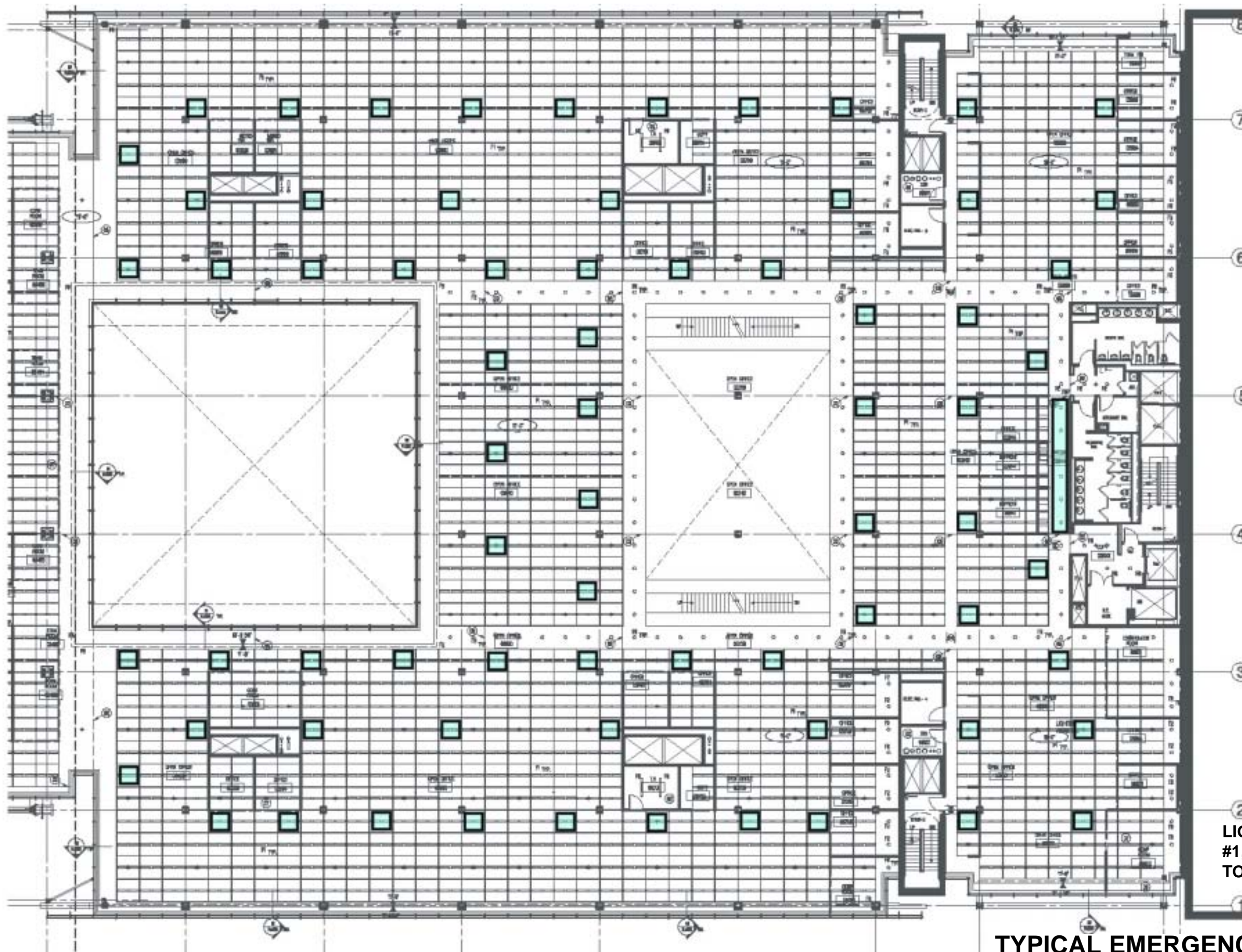
LIGHTING DESIGN

**3rd Floor
East**

Sept. 22nd, 2004

**Control Intent
Diagram**

CSK-4



TYPICAL EMERGENCY FIXTURES

LIGHTING SEQUENCE
#1, #2, #3, #4, #5
TOTAL OF 78 FIXTURES

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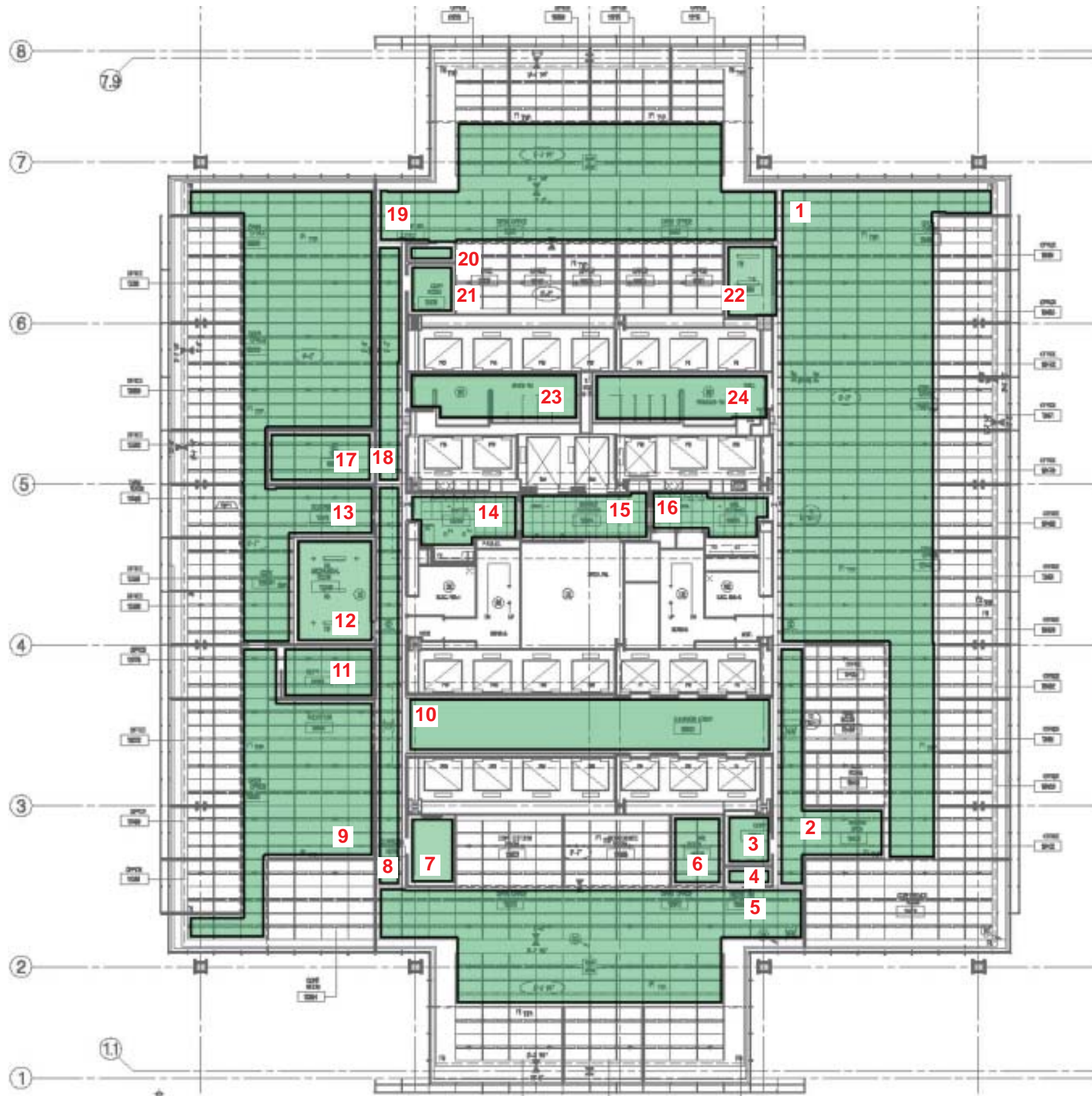
LIGHTING DESIGN

3rd Floor
East

Sept. 22nd, 2004

Control Intent
 Diagram

CSK-5



 OCCUPANCY CONTROL ZONES

LIGHTING SEQUENCE
#1,#3,#4,#5

TOTAL OF 24 ZONES

OCCUPANCY CONTROL ZONES



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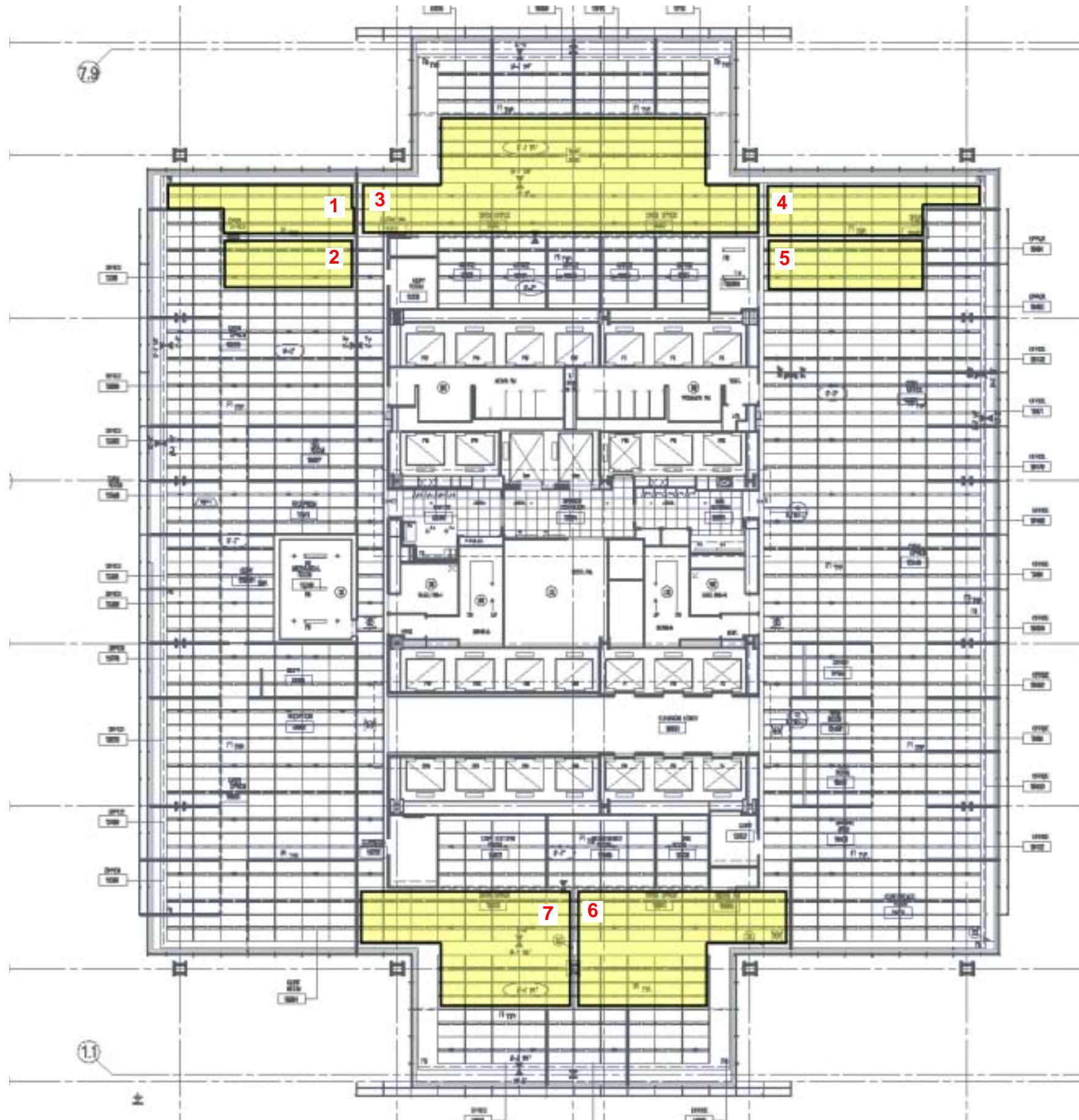
LIGHTING DESIGN

13th Floor

Sept. 22nd, 2004

Control Intent
Diagram

CSK-1



LIGHTING SEQUENCE #3, #4
TOTAL OF 7 ZONES

DAYLIGHT DALI DIMMING ZONES



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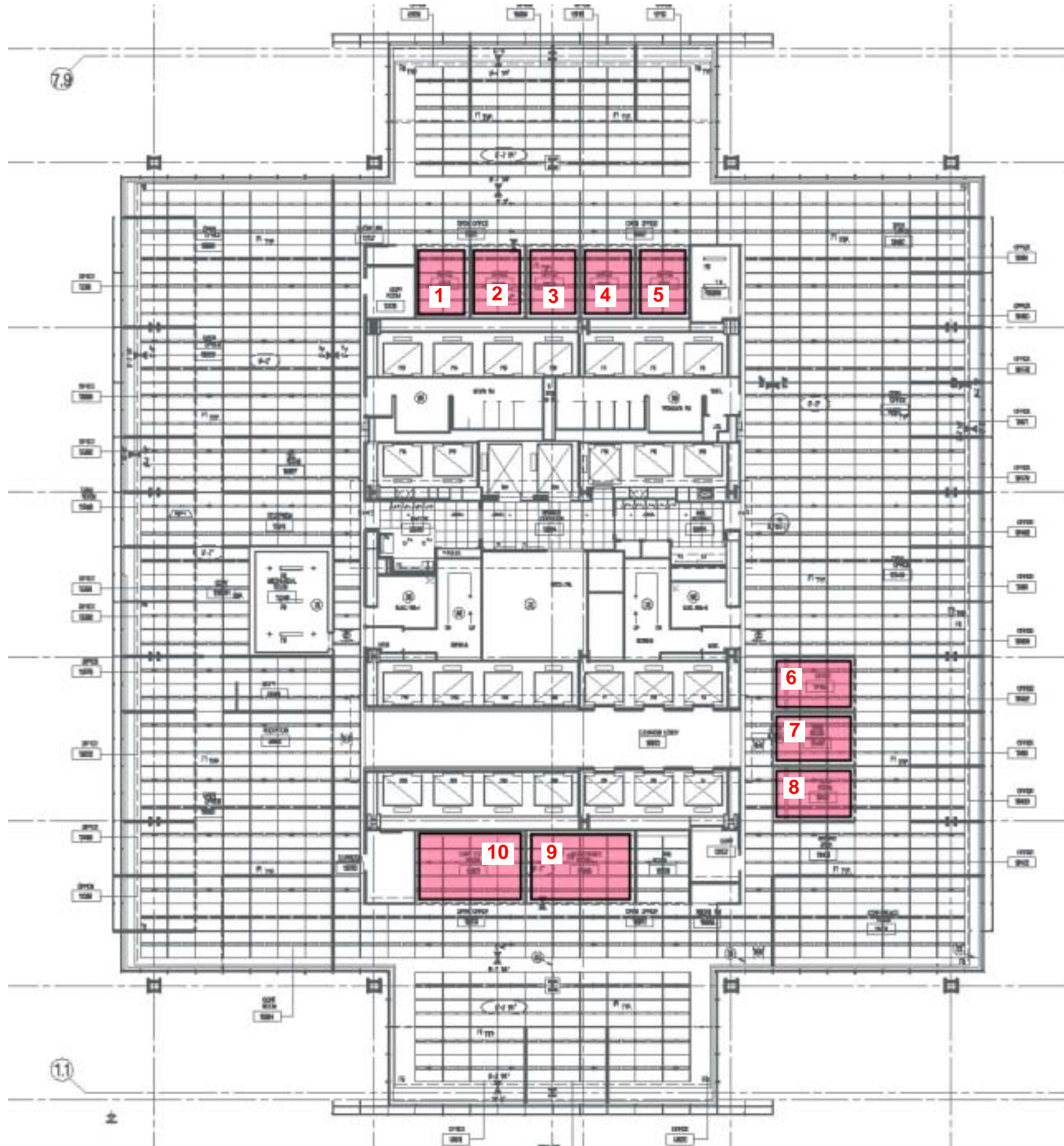
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Control Intent
Diagram

CSK-2



LIGHTING SEQUENCE #2, #3
TOTAL OF 10 ZONES

MANUAL DALI DIMMING
(WALL BOX SWITCH) AND
OCCUPANCY CONTROL
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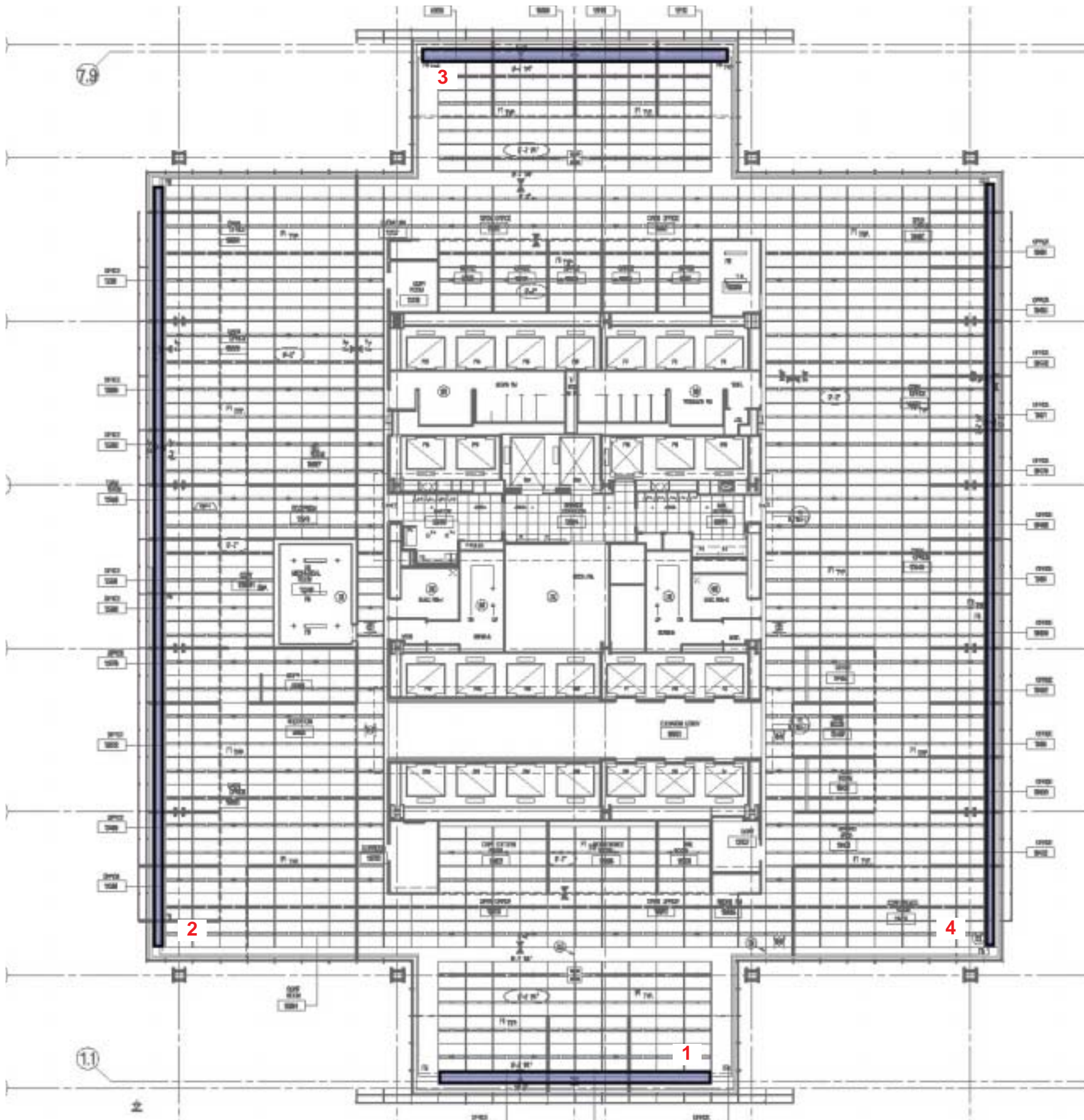
LIGHTING DESIGN

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Sept. 22nd, 2004

Control Intent
Diagram

CSK-3



LIGHTING SEQUENCE #6
TOTAL OF 4 ZONES

TIME CLOCK CONTROL ZONES



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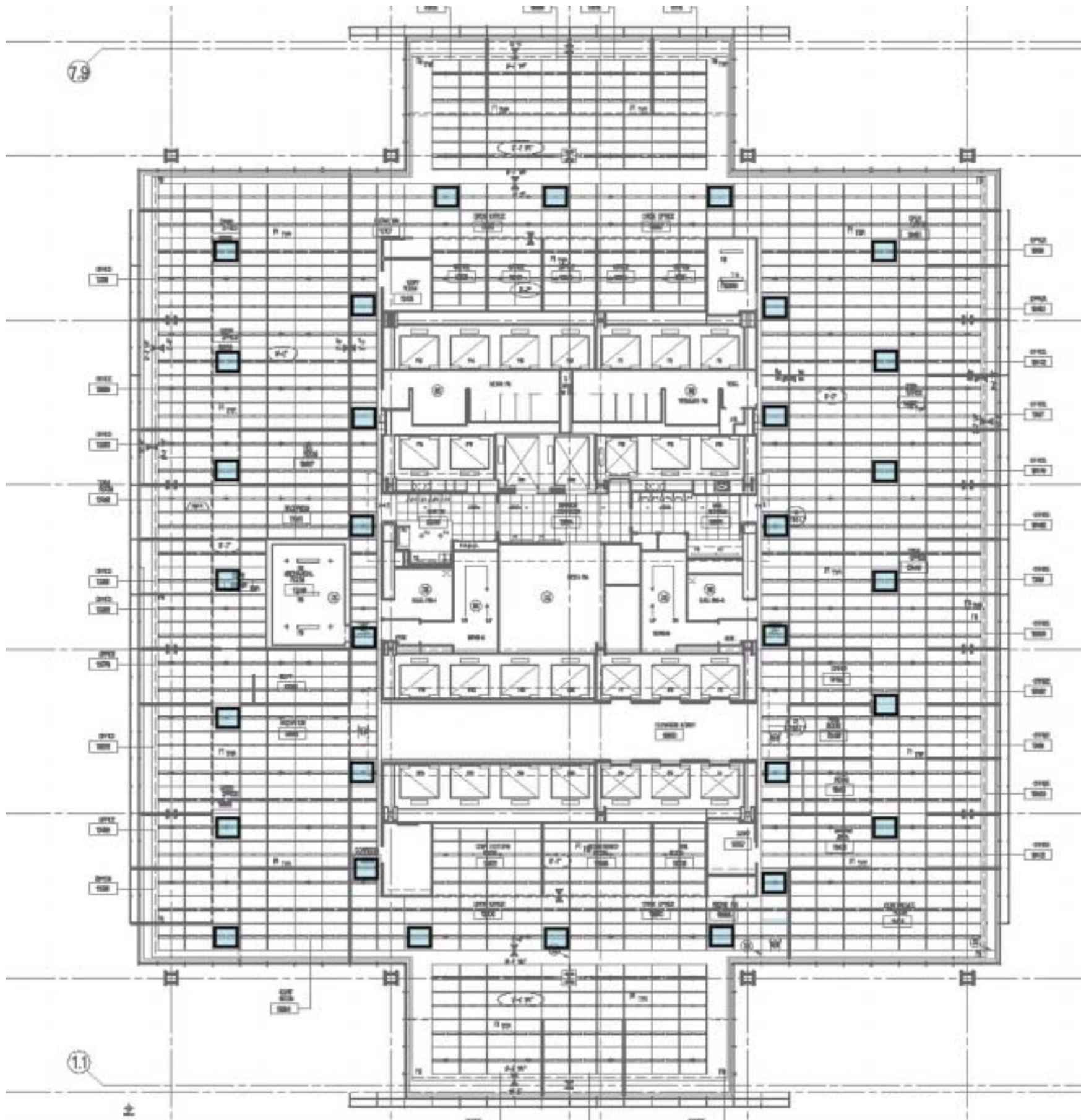
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Sept. 22nd, 2004

Control Intent
Diagram

CSK-4



TYPICAL EMERGENCY FIXTURES



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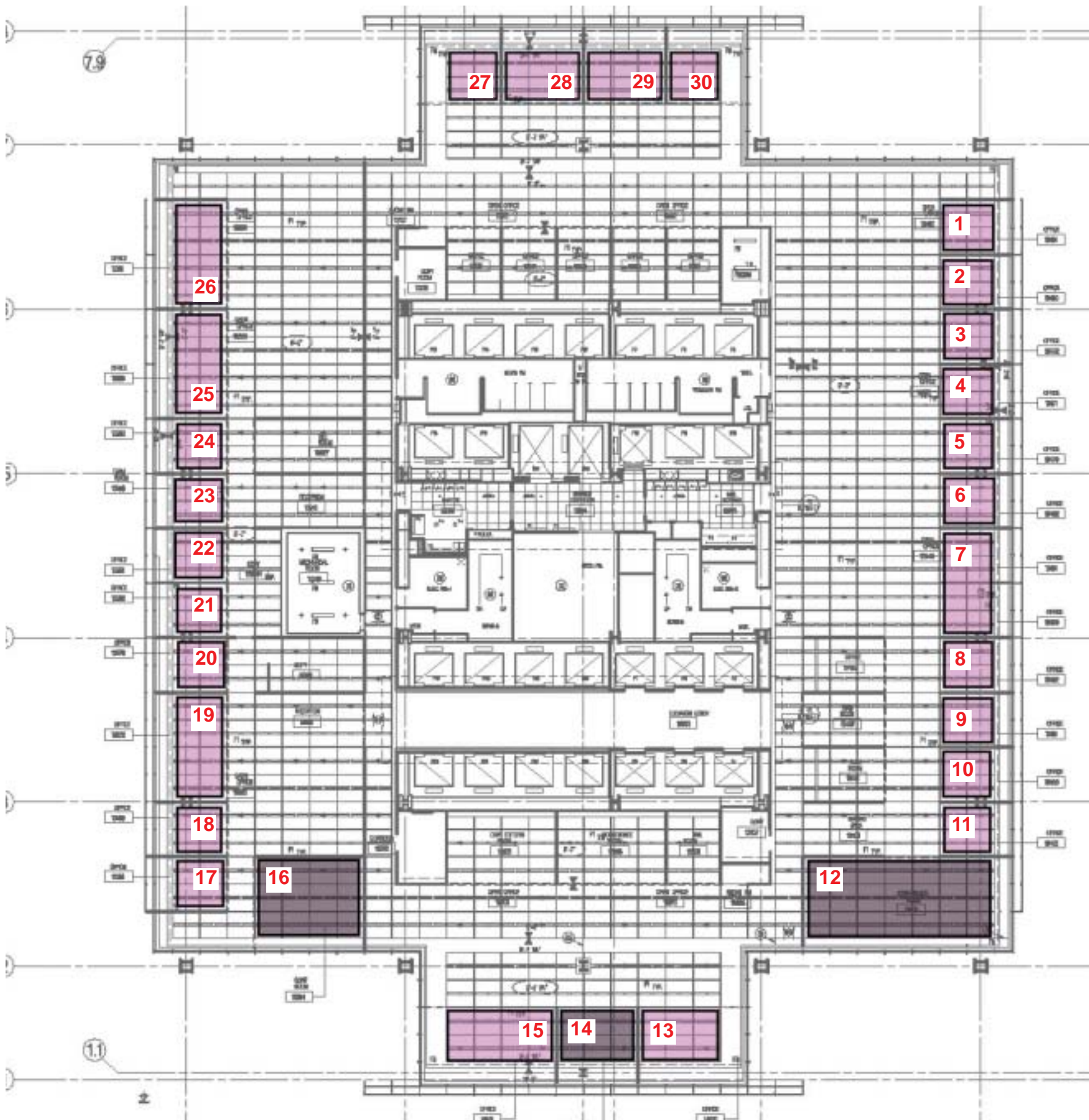
LIGHTING DESIGN

13th Floor

Sept. 22nd, 2004

Control Intent
Diagram

CSK-5



WITH MULTIPLE PRESET DIMMER CONTROL

LIGHTING SEQUENCE #2, #3

**MANUAL DALI DIMMING
(WALL BOX SWITCH), DAY-
LIGHT SENSOR (PHOTOCELL)
AND OCCUPANCY CONTROL
ZONES**



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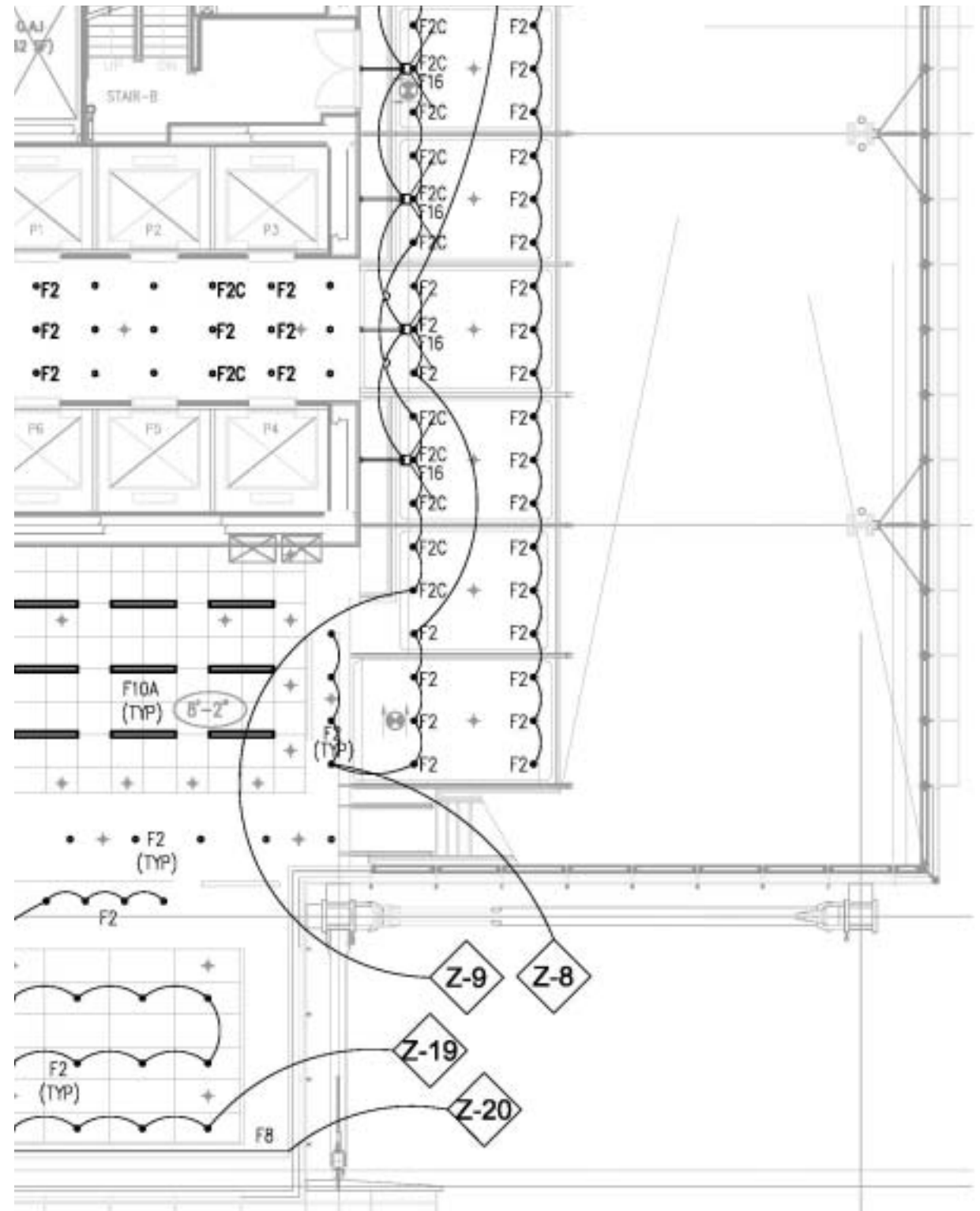
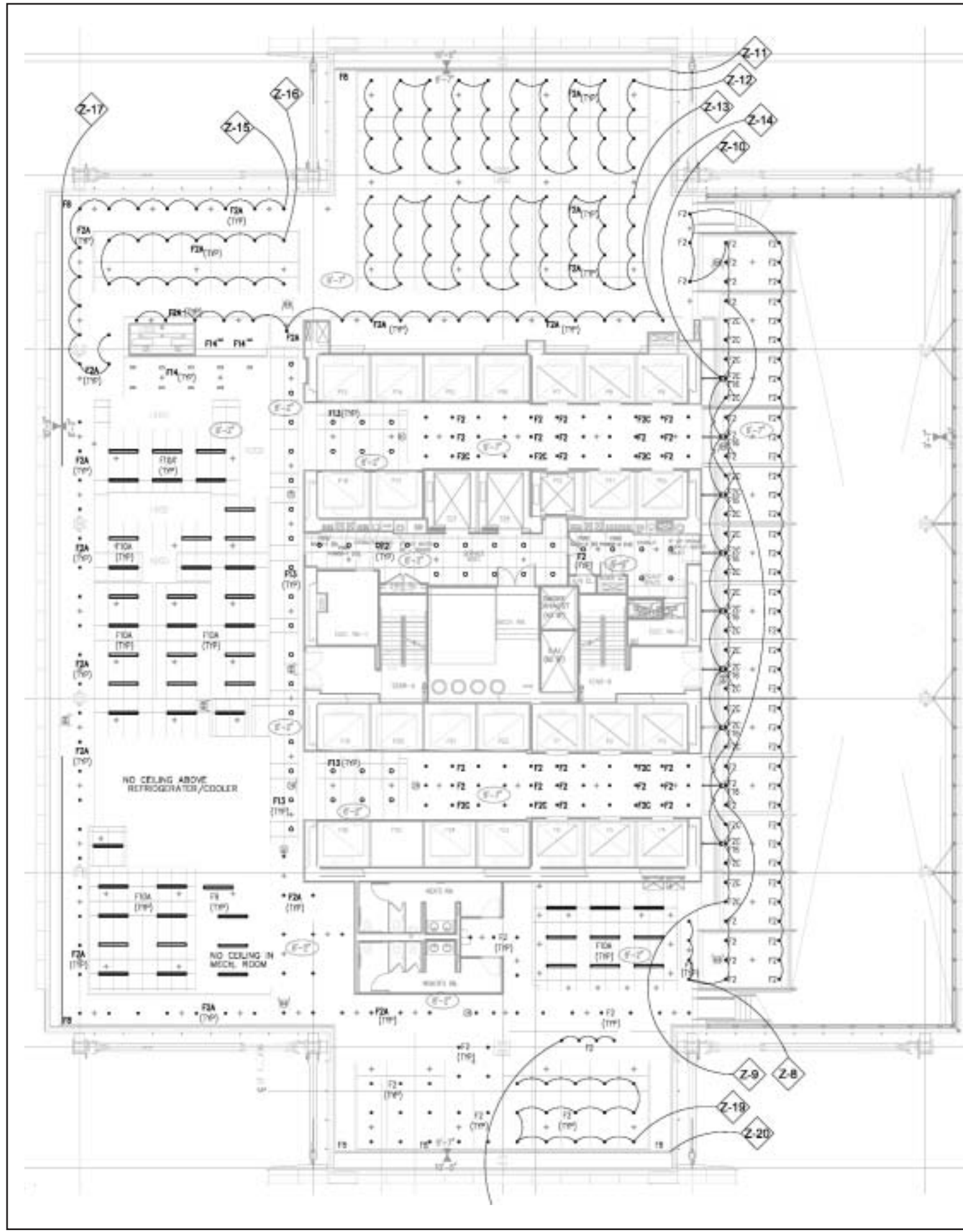
LIGHTING DESIGN

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Sept. 22nd, 2004

Control Intent
Diagram

CSK-6



LIGHTING SEQUENCE #8
TOTAL OF 13 ZONES

14th FL CONTROL DIAGRAM

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LIGHTING DESIGN

14th Floor

Sept. 22nd, 2004

Control Intent
Diagram

CSK-1



LIGHTING SEQUENCE #1, #3, #4, #5
TOTAL OF 16 ZONES

OCCUPANCE CONTROL

ADDENDUM #1 Revised Sep. 02nd, 2004



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22 West 19th Street New York, NY
11001

Interior Architect
GENSLER ARCHITECT
One Rockefeller Plaza, New York, NY
10020

NEW YORK
TIMES
BUILDING

630 EIGHT AVENUE,
NEW YORK, NEW YORK

LIGHTING DESIGN

14th Floor

Sept. 22nd, 2004

Control Intent
Diagram

CSK-2

DIMMING LOAD SCHEDULE

14th Floor

Zone	Type	Description	Volts	No. of Fixtures	Watts / Fixture	Total Watts	Location/ Focus
Z-8	F-2	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	57	50	285+0	Cafeteria - Perimeter
Z-9	F-2C	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	25	50	1250	Cafeteria - Perimeter
Z-10	F-16	Wall bracket uplight with (1) 300t low voltage T-3 lamp and magnetic transformer	120	9	300	2700	Cafeteria - Perimeter
Z-11	F-8	Perimeter T-5 Fulorescent uplight cove with non dim ballast	277	11x4'-0"	28W/4'-0"	308	Servery - Perimeter
Z-12	F-2A	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	40	50	2000	Servery
Z-13	F-2A	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	40	50	2000	Servery
Z-14	F-2A	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	18	50	900	Servery - Perimeter
Z-15	F-2A	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	15	50	750	Servery - Perimeter
Z-16	F-2A	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	14	50	700	Servery
Z-17	F-8	Perimeter T-5 Fulorescent uplight cove with non dim ballast	277	7x4'-0"	28W/4'-0"	196	Servery - Perimeter
Z-18	F-2	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	4	50	200	Annex Private Dinning
Z-19	F-2	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	15	50	750	Annex Private Dinning
Z-20	F-8	Perimeter T-5 Fulorescent uplight cove with non dim ballast	277	5x4'-0"	28W/4'-0"	140	Annex Private Dinning

DIMMING LOAD SCHEDULE

General Notes:

All Fluorescent circuit should have 277V. See following dimming graphs for detail.

1. Loads are calculated for lamps only; electrical engineer to calculate for wattage input of ballasts and step-down transformers.
2. Emergency requirements to be designed and specified by Electrical Engineer, Electrical Contractor to coordinate.
3. All fluorescent run lengths and loads to be verified in field by the Contractor.

15th Floor

Zone	Type	Description	Volts	No. of Fixtures	Watts / Fixture	Total Watts	Location/ Focus
Z-1	F-8	Perimeter T-5 Fulorescent uplight cove with non dim ballast	277	28x4'-0"	28W/4'-0"	784	Cafeteria - Perimeter
Z-2	F-2	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	40	50	2000	Cafeteria
Z-3	F-12	Surface mounted adjustable downlight with (1) 75Watt Par30 lamp	120	56	75	4200	Cafeteria
Z-4	F-12A	Surface mounted adjustable downlight with (1) 75Watt Par30 lamp	120	28	75	2100	Cafeteria
Z-5	F-11	Pendant with (1) 100 Watt low voltage T-6 lamp and magnetic transformer	12/120	24	100	2400	Cafeteria
Z-6	F-2C	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	29	50	1450	Cafeteria - Perimeter
Z-7	F-2	Recessed downlight with (1) 50Watt low voltage MR16 lamp and magnetic transformer	12	24	50	1200	Cafeteria - Perimeter

LIGHTING SEQUENCE #7 & #8
TOTAL OF 7

14th & 15th FL CONTROL LOAD SCHEDULE



SBLD
studio

132 W 36th St
NY, NY 10018
212.391.4230 T
212.391.4231 F
sblstudio.com

Clients:
THE NEW YORK TIMES
229 W. 43rd St. New York, 10036

Architect
RENZO PIANO BUILDING WORKSHOP
34,Rue Des Archives 75004 PARIS

FOX & FOWLE ARCHITECTS, P.C.
22 West 19th Street New York, NY
11001

Interior Architect
GENSLER ARCHITECT
One Rockefeller Plaza, New York, NY
10020

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630 EIGHT AVENUE,
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LIGHTING DESIGN

14th & 15th
Floor

Sept. 22nd, 2004

Control Intent
Diagram

CSK-2



LIGHTING SEQUENCE #1, #3, #4 & #5

TOTAL OF 19 ZONES

OCCUPANCY CONTROL ZONES

ADDENDUM #1 Revised Sep. 02nd, 2004



**SBLD
studio**

132 W 36th St
NY, NY 10018
212.391.4230 T
212.391.4231 F
sblstudio.com

Clients:
THE NEW YORK TIMES
229 W. 43rd St. New York, 10036

Architect
RENZO PIANO BUILDING WORKSHOP
34, Rue Des Archives 75004 PARIS

FOX & FOWLE ARCHITECTS, P.C.
22 West 19th Street New York, NY
11001

Interior Architect
GENSLER ARCHITECT
One Rockefeller Plaza, New York, NY
10020

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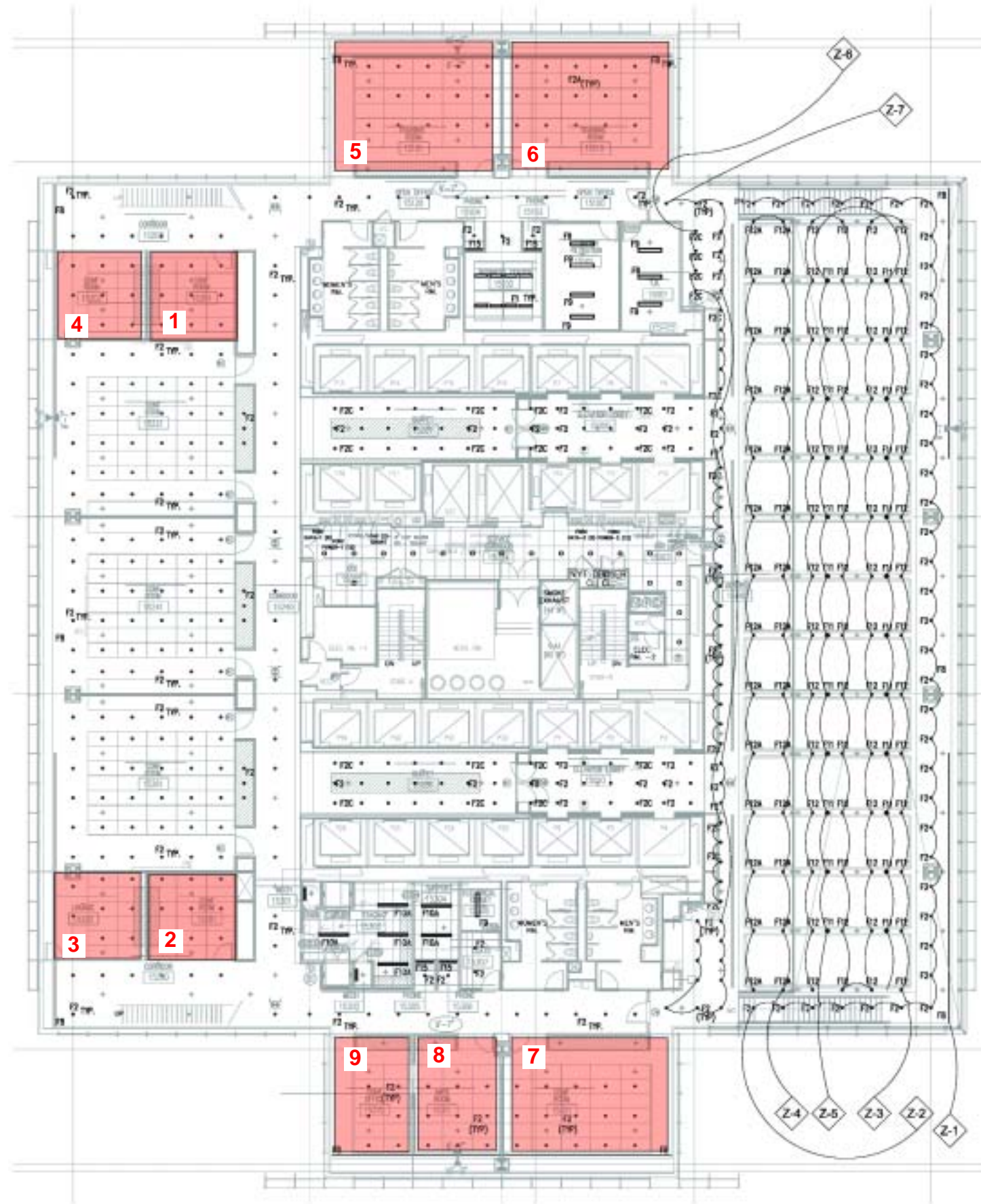
LIGHTING DESIGN

15th Floor

Sept. 22nd, 2004

Control Intent
Diagram

CSK-2



LIGHTING SEQUENCE #2, #3
TOTAL OF 9 ZONES

MANUAL DALI DIMMING (WALL-BOX SWITCH) DAYLIGHT SENSOR (PHOTOCELL) AND OCCUPANCY CONTROL ZONES

ADDENDUM #1 Revised Sep. 02nd, 2004

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Architect
RENZO PIANO BUILDING WORKSHOP
34, Rue Des Archives 75004 PARIS

FOX & FOWLE ARCHITECTS, P. C.
22 West 19th Street New York, NY
11001

Interior Architect
GENSLER ARCHITECT
One Rockefeller Plaza, New York, NY
10020

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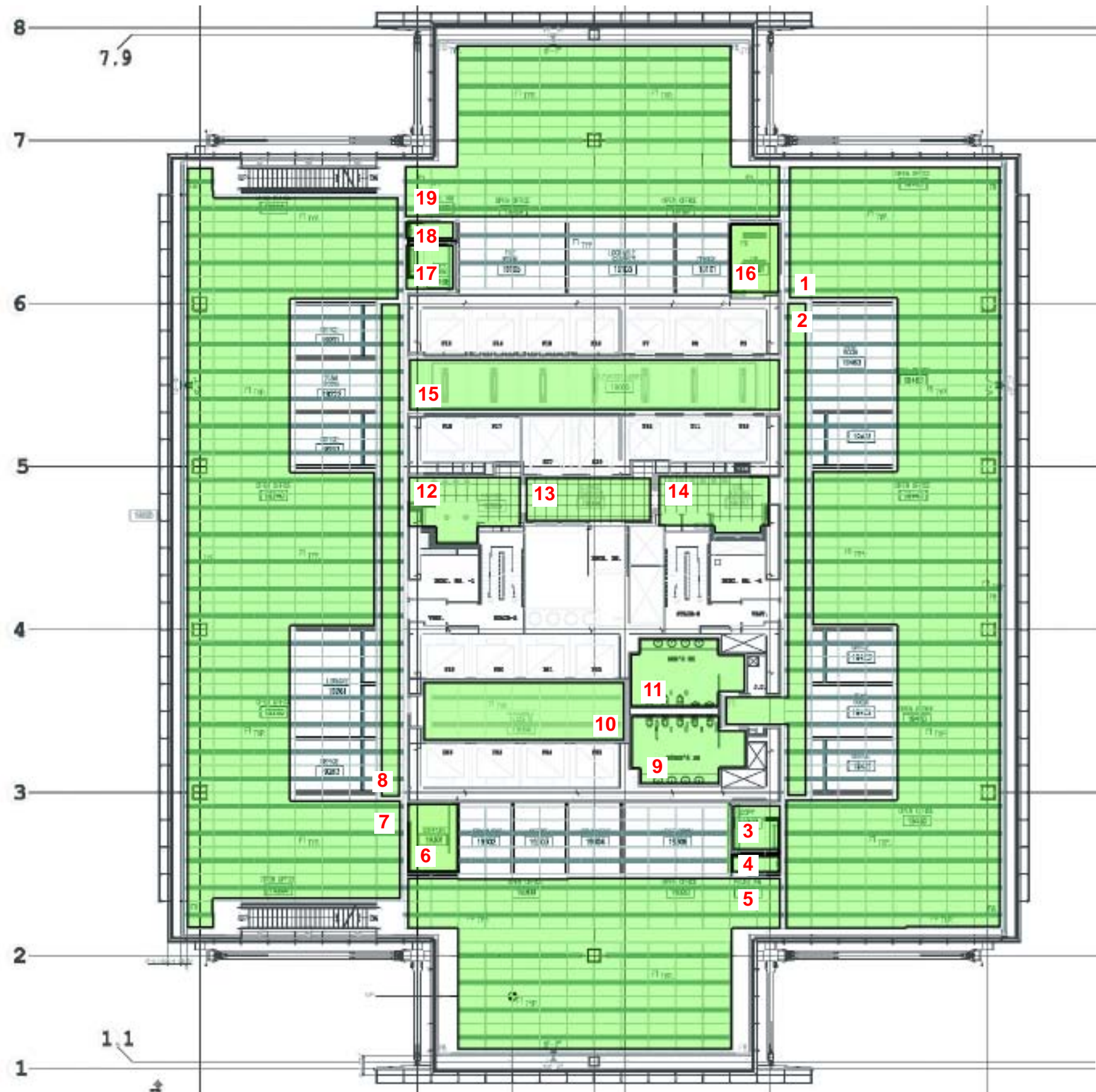
LIGHTING DESIGN

15th Floor

Sept. 22nd, 2004

Control Intent
Diagram

CSK-3



OCCUPANCY CONTROL ZONES

LIGHTING SEQUENCES
 #1, #3, #4, #5
 TOTAL OF 19 ZONES

OCCUPANCY CONTROL ZONES



**SBLD
studio**

132 W 36th St
 NY, NY 10018
 212.391.4230 T
 212.391.4231 F
 sbldstudio.com

Clients:
 THE NEW YORK TIMES
 229 W. 43rd St. New York, 10036

Architect
 RENZO PIANO BUILDING WORKSHOP
 34, Rue Des Archives 75004 PARIS

FOX & FOWLE ARCHITECTS, P. C.
 22 West 19th Street New York, NY
 11001

Interior Architect
 GENSLER ARCHITECT
 One Rockefeller Plaza, New York, NY
 10020

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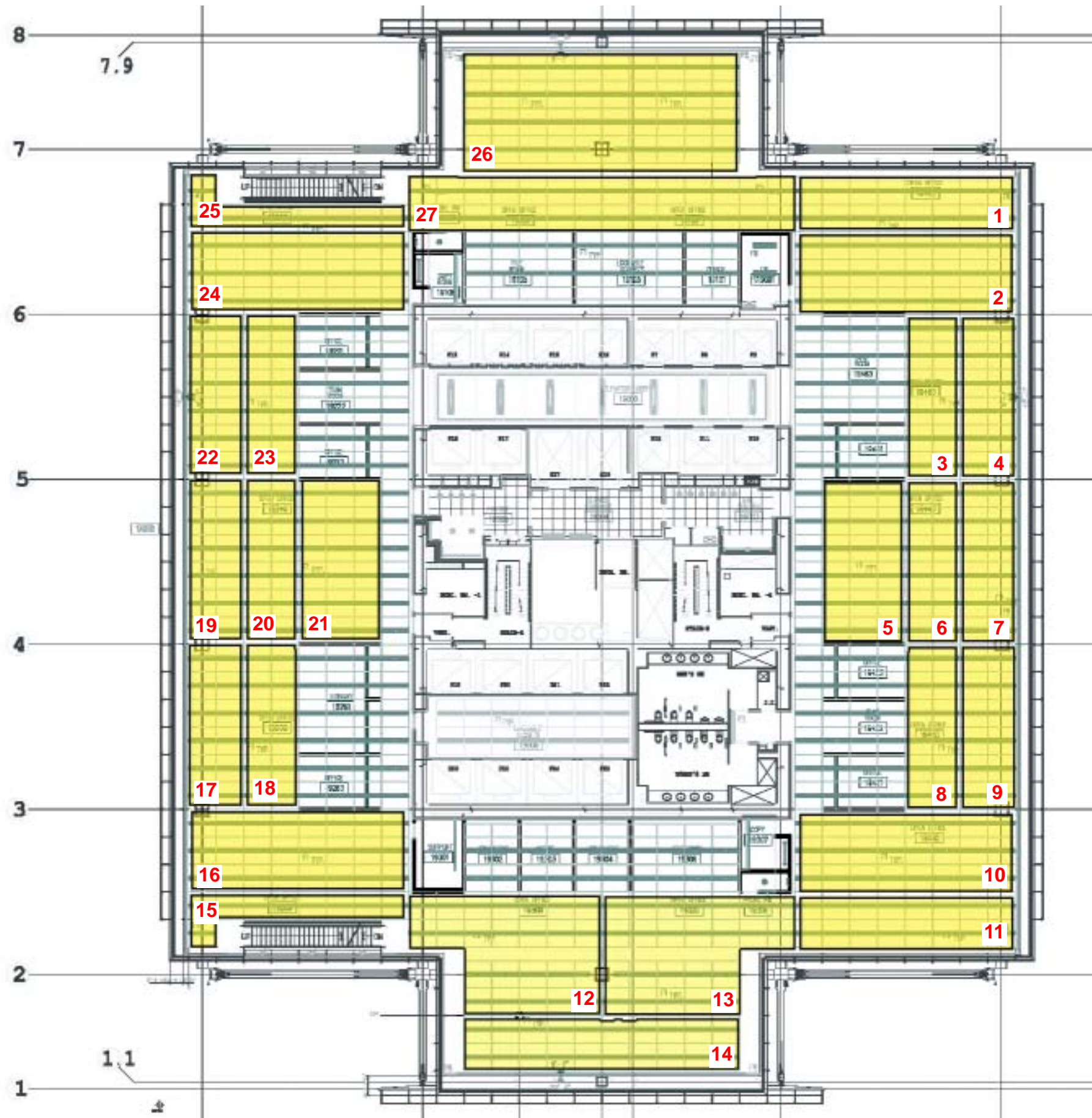
LIGHTING DESIGN

19th Floor

Sept. 22nd, 2004

**Control Intent
Diagram**

CSK-1



LIGHTING SEQUENCE #3, #4
TOTAL OF 27 ZONES

DAYLIGHT DALI DIMMING ZONES



SBLD
studio

132 W 36th St
NY, NY 10018
212.391.4230 T
212.391.4231 F
sblidstudio.com

Clients:
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Architect
RENZO PIANO BUILDING WORKSHOP
34, Rue Des Archives 75004 PARIS

FOX & FOWLE ARCHITECTS, P.C.
22 West 19th Street New York, NY
11001

Interior Architect
GENSLER ARCHITECT
One Rockefeller Plaza, New York, NY
10020

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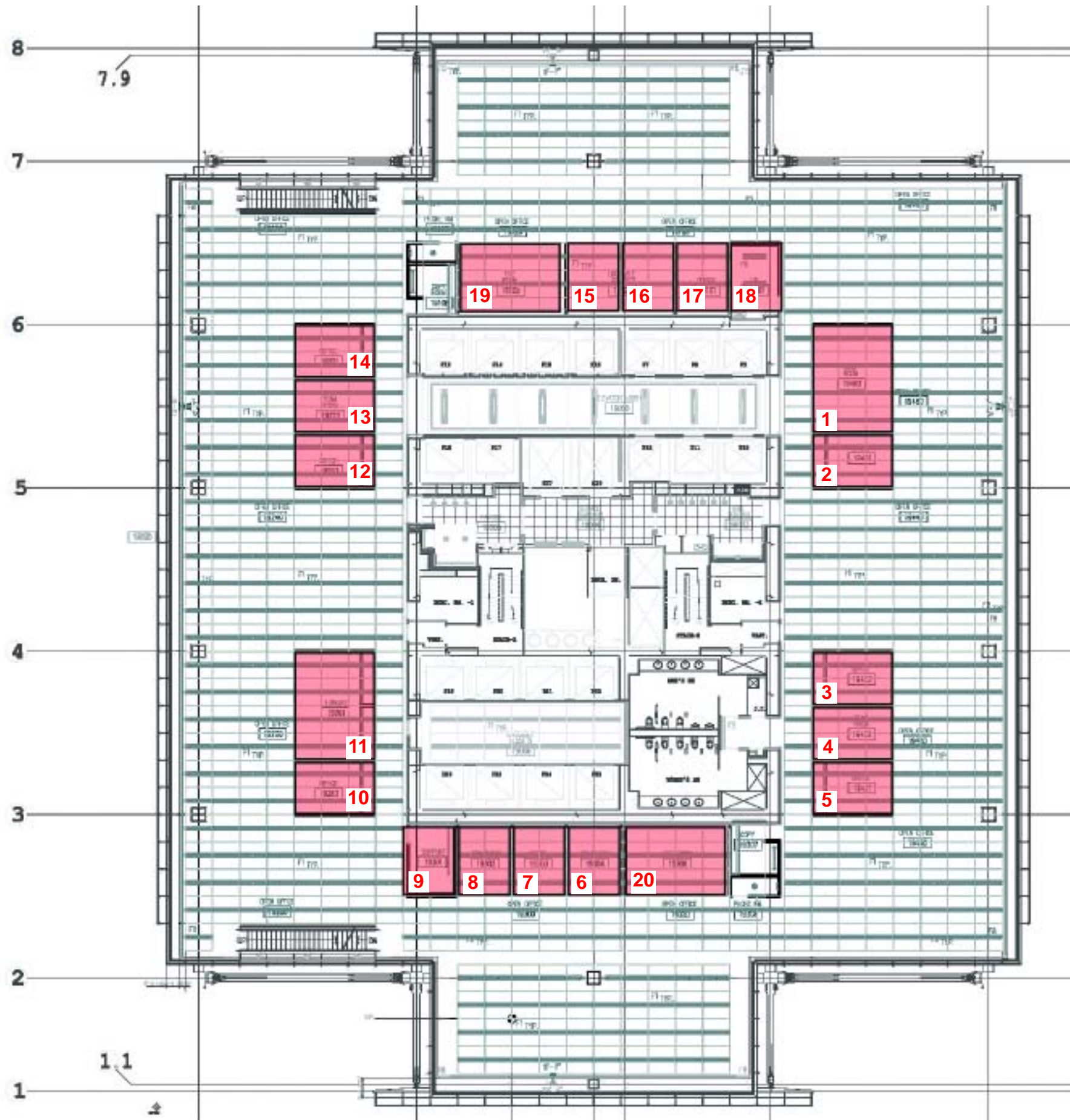
LIGHTING DESIGN

19th Floor

Sept. 22nd, 2004

Control Intent
Diagram

CSK-2



LIGHTING SEQUENCE #2, #3
TOTAL OF 20 ZONES

**MANUAL DALI DIMMING
(WALL BOX SWITCH) AND
OCCUPANCY CONTROL
ZONES**



**SBLD
studio**
132 W 36th St
NY, NY 10018
212.391.4230 T
212.391.4231 F
sblstudio.com

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Architect
RENZO PIANO BUILDING WORKSHOP
34, Rue Des Archives 75004 PARIS

FOX & FOWLE ARCHITECTS, P. C.
22 West 19th Street New York, NY
11001

Interior Architect
GENSLER ARCHITECT
One Rockefeller Plaza, New York, NY
10020

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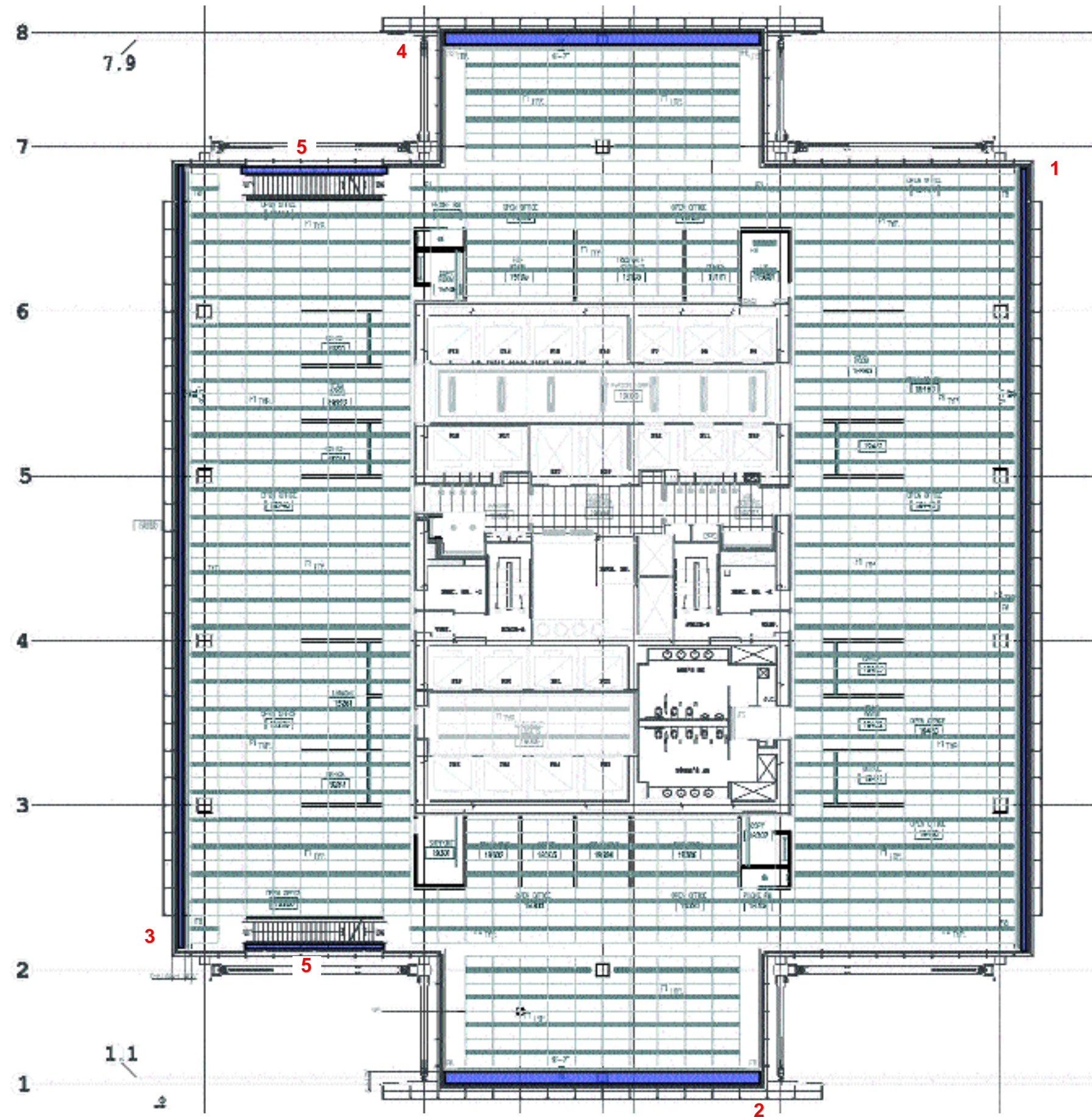
LIGHTING DESIGN

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Control Intent
Diagram

CSK-3



LIGHTING SEQUENCE #6
TOTAL OF 5 ZONES

TIME CLOCK CONTROL ZONES



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studio**

132 W 36th St
NY, NY 10018
212.391.4230 T
212.391.4231 F
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Architect
RENZO PIANO BUILDING WORKSHOP
34, Rue Des Archives 75004 PARIS

FOX & FOWLE ARCHITECTS, P.C.
22 West 19th Street New York, NY
11001

Interior Architect
GENSLER ARCHITECT
One Rockefeller Plaza, New York, NY
10020

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630 EIGHT AVENUE,
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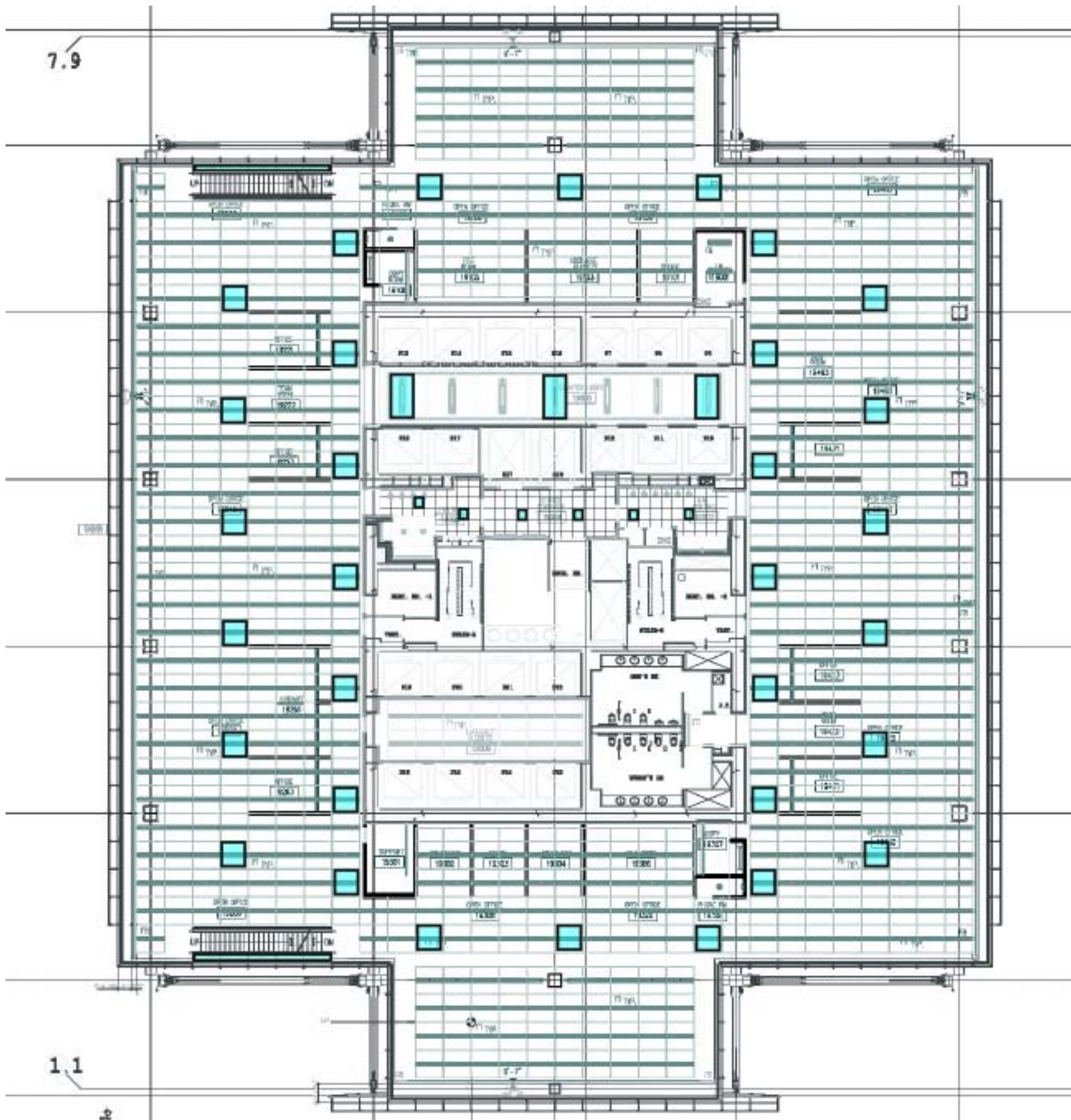
LIGHTING DESIGN

19th Floor

Sept. 22nd, 2004

Control Intent
Diagram

CSK-4



LIGHTING SEQUENCE #1, #2, #3, #4, #5
TOTALLY OF 46 FIXTURES

TYPICAL EMERGENCY FIXTURES



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studio**

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NY, NY 10018
212.391.4230 T
212.391.4231 F
sblidstudio.com

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THE NEW YORK TIMES
229 W. 43rd St. New York, 10036

Architect
RENZO PIANO BUILDING WORKSHOP
34, Rue Des Archives 75004 PARIS

FOX & FOWLE ARCHITECTS, P. C.
22 West 19th Street New York, NY
11001

Interior Architect
GENSLER ARCHITECT
One Rockefeller Plaza, New York, NY
10020

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Diagram

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